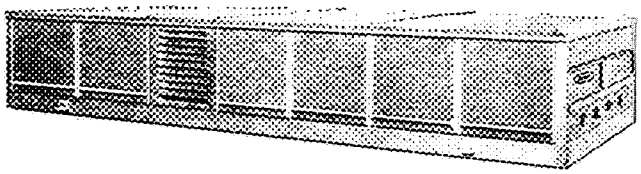
Number One Air Conditioning Maker
Carrier
Division of Carrier Corporation
Carrier Parkway • Syracuse, N Y 13201
Application Data
48MA, 50ME

Packaged Rooftop Multizone Units

DX Cooling/Natural or LP Gas, Electric or Hot Water/Glycol Heat



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INTRODUCTION

The Carrier 48MA/50ME modular multizone differs markedly from the traditional hot deck/cold deck reheat multizone. Carrier's packaged rooftop units do not employ the hot deck/cold deck principle or the zoning dampers associated with conventional units.

Carrier's distinctive design – individual modules for heating and/or cooling with constant module airflow, is a true innovation to the multizone market. The modular units heat, cool or dehumidify in each module simultaneously and independently of all other modules. Modules can serve individual zones or be grouped together to serve larger zones.

The modular multizones are available in 6 sizes based on cooling capacity.

Capacity (tons)	No. of Modules	Unit Designation
15	8	48MA/50ME016
20	8	48MA/50ME024
25	10	48MA/50ME028
28 5	10	48MA/50ME030
30	12	48MA/50ME034
37	12	48MA/50ME040

LP or natural gas, electric resistance or hot water/glycol heating options are available to maximize efficient use of local energy resources. Economizers, power exhaust, roll filters and high-efficiency filters are also available as factory installed options – all providing a greater flexibility in applying the modular multizone to specific job requirements.

A recent multizone energy study compared the energy usage of the Carrier modular units with 3 competitive designs. The study simulated (by computer) the operation of the units for one year in a typical building in each of 14 major U.S. cities. The cities represented complete coverage of the climatic conditions experienced throughout the country. Study results showed the Carrier multizone consumed less energy than the others in each case considered under all climatic conditions. Details of the energy study are contained in the Carrier brochure, The Modular Multizone Versus the Others.

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Table 1 — Physical Data

UNIT 48MA OR 50ME	016	024	028	030	034	040
Zone Modules	8	8	10	10	12	12
OPERATING WT (lb)						
Base Unit 48MA	3385	3805	4075	4080	4800	5700
Base Unit 50ME (with heat)	2985	3405	3665	3670	4400	5250
Roof Curb	506	506	506	506	630	630
REFRIG CHARGE (lb, R-22)	28	32	43	43	57	65
COMPRESSOR	Reciprocating Hermetic, 1725 Rpm					
No. 1 Type	06DE537	06DE824	06DE537	06DE537	06DE537	06EE250
Cylinders ... Unloaders	6 2	6 .. 2	6 . 2	6 . . 2	6 ... 2	4 . . 1
No. 2 Type	–	06DA824	06DA824	06DA537	06DA537	06EA250
Cylinders (has no unloaders)	–	6	6	6	6	4
System Oil Charge (pts)	11	22	22	22	21	31
Unloader Settings (psig)	Compressor No. 1 Only					
Left Bank Loads	71.0 ± 1 5					–
Left Bank Unloads	57.5 ± 2 5					–
Right Bank Loads	76 0 ± 1 5					75.5 ± 1 5
Right Bank Unloads	62 5 ± 2.5					58.0 ± 2 5
Capacity Steps (%)	100,67,33	100,83,67 50,33,17	100,80,60 40,20	100,80,60 40,20	100,83,67 50,33,17	100,75, 50,25
OUTDOOR AIR FANS	Propeller, Direct Drive					
Mtr Hp ... Rpm ... Frame (NEMA)						
No. 1	1 . 1075 ... 56 (1-phase)					
No. 2	1 ... 1140 . . 56 (3-phase)					
No. 3	–	–	–	–	1 1140 . 56 (3-ph)	
INDOOR AIR FANS						
No. ... Size (in.)	2 ... 15x15	2 . 15x15	2 . 15x15	2 . 15x15	3 ... 15x9	3 . 15x9
Cfm (Nom)	6000	8000	10,000	10,000	12,000	12,000
Motor Hp ... Rpm Std	5 . . 1725	7½ ... 1725	10 ... 1725	10 ... 1725	15 ... 1725	15 ... 1725
Opt	–	–	–	–	20 ... 1725	20 ... 1725
Fan Pulley						
Outside Diameter (in.)	10.6	10.6	8 0	8 0	8 0	8.0
Bore (in.)	1 3/16	1 3/16	1 3/16	1 3/16	1 11/16	1 11/16
Fan Belt No. ... Size w/Std Mtr	1 3V630	1 ... 3V630	2 ... 3V560	2 . 3V560	2 3V630	2 ... 3V630
w/Opt Mtr	–	–	–	–	3 . 3V670	3 . . 3V670
Motor Pulley A	Factory Installed					
Outside Diam (in.) w/Std Mtr	5.3	6.0	5 0	5 0	5 0	5.0
w/Opt Mtr	–	–	–	–	6.0	6.0
Bore (in.)	1⅛	1⅜	1⅜	1⅜	1⅝	1⅝
Resulting Fan Rpm w/Std Mtr	880	995	1095	1095	1095	1095
w/Opt Mtr	–	–	–	–	1320	1320
Motor Pulley B	Shipped With Unit					
Outside Diam (in.) w/Std Mtr	6.0	6 9	5.6	5 6	5 6	5.6
w/Opt Mtr	–	–	–	–	6.5	6.5
Resulting Fan Rpm w/Std Mtr	995	1145	1230	1230	1230	1230
w/Opt Mtr	–	–	–	–	1425	1425
HEATING SECTION (48MA)	2-Stage Furnace Assembly in Each Zone Module					
Rise Range	25 F to 55 F at 0 75 in. wg ESP					
Input (1000 Btuh) Min-Max Total	240-480	240-480	300-600	300-600	360-720	360-720
Each Module	60	60	60	60	60	60
Bonnet Cap. (1000 Btuh) Total	360	360	450	450	540	540
Stage 1/Stage 1 + 2	22.5/45.0	22.5/45.0	22.5/45.0	22.5/45.0	22.5/45.0	22.5/45.0
HEATING SECTION (50ME ELEC)	See Electrical Data Table for Electric Heat Data					
HEATING SECTION (50ME, GLY.)	1 Heating Coil in each Zone Module					
Max allowable inlet temperature	200 F					
Max allowable flow, each coil	6 gpm					
Solution mixture	20% glycol					
Max allowable working pressure	30 psig					
Total internal volume (gals)	2.61	2.61	3.15	3.15	3 76	3.76
PRESSURE SWITCHES						
Low-Pressure Cutout	29 ± 5 psig					
Low-Pressure Cut-in	39 ± 5 psig					
High-Pressure Cutout	400 ± 5 psig					
High-Pressure Cut-in	300 ± 5 psig					
Indoor Air Flow Switch (AFS 1)						
Factory Setting (cfm)	6000				9000	
Adjustment Range (cfm)	4000-6000				6000-9000	
INDOOR AIR FILTERS						
Std No. ... Size (in.)	12 ... 20x25x2					
High Efficiency (optional) No. ... Size (in.)	Same but with 36.5% efficiency (NBS Dust Spot Test)					
Roll Media (optional)	65 ft of 2-in. media					

CONSTRUCTION

General — Carrier Modular multizones are sturdy and lightweight. The units are ideal for rooftop applications where low silhouettes are required. Maximum height of any 48MA/50ME unit mounted on a matching roof curb is less than 5 feet. Each unit is of one-piece design with extruded aluminum frame and 26 ga steel top and side panel construction. Panels are easily removed for access to unit interior. Assembled, the insulated unit will not sweat at 77 F wet-bulb on cooling days. The unit insulation conserves heat energy in the winter, keeping energy costs to a minimum.

The unit roof curb, constructed of 14 ga galvanized steel, is National Roofing Contractors Association (NRCA) approved. A condenser run-off sheet is built into the curb and is insulated to prevent heat transfer. The curb is designed to be flashed to the roof and includes wood nailers to aid installation. All duct and utility connections are inside the curb perimeter.

Service access on side panels is accomplished by removing latches on each side of panel. The side panel gaskets provide complete perimeter sealing when compressed against the base unit frame. Each 48MA/50ME unit has large, waterproof condensate pans to prevent moisture leakage into the conditioned space. Galvanneal steel panel surfaces are bonderized and finished with Carrier Weather Armor, a baked enamel finish.

Filters are 2-in. throwaway fiberglass with an NBS efficiency of 10%. High efficiency (36.5% NBS) throwaway filters are available as a factory-installed option. With 41.5 square feet of zone filter area standard, both the low- and high-efficiency filters are extremely effective. With this large area, filter velocity is low — 335 fpm in the 48MA/50ME040 and 145 fpm in the 48MA/50ME016. A roll filter package is available as a factory-installed option.

The package consists of 65 ft of 2-in. filter media, automatic media advance switch, advance motor and a runout switch. Outside air is drawn into the unit thru louvered side panels and prefiltered by cleanable outdoor air filters in the panels.

Electrical — The Carrier Modular multizones include factory-installed power and control circuit breakers which are suitable for use as disconnect switches where local codes permit. A 350-va, 115-volt convenience outlet on the main control panel allows use of a trouble light or small power tools.

Etched solid copper circuit panels with interchangeable plug-in relays and marked terminal boards are used in all units to improve reliability and simplify the modular design. Conventional commercial 24-volt, 2-stage heat/2-stage cool thermostats are readily wired to marked terminals on the zone control board. Modules combined to make a single, large zone are controlled by a single thermostat by wiring the zone module control terminals as illustrated in thermostat usage section using factory-supplied jumpers.

Refrigeration System — The modular multizone units incorporate individual zone evaporator coils plus an outdoor air (Humidry®) evaporator coil (see Fig. 1). The zone coils are controlled by room thermostats thru a liquid line solenoid valve. The metering device for the zone evaporators is a capillary tube.

The outdoor air evaporator coil cools and dehumidifies the outside air drawn into the unit. This coil is a "free floating" coil; that is, after the first zone cooling coil is activated by cooling demand, the outdoor air coil is controlled by suction pressure only. Since the outdoor air evaporator coil handles a varying load, a thermal expansion valve is used to meter the correct amount of liquid refrigerant to this coil.

The load on unit compressors varies depending on outdoor air coil load and the number of zone coils in operation simultaneously. Compressor unloaders and hot gas bypass valves are employed to compensate for the variation. The 15-ton unit unloads to 1/3 or 5 tons, the 20-ton unit to 1/6 or 3.3 tons, the 25-ton unit to 1/5 or 5 tons, the 28-ton unit to 1/6 or 4.7 tons, the 30-ton unit to 1/6 or 5 tons, and the 37-ton unit to 1/4 or 9.3 tons. The unloaders operate from suction pressure to maintain system suction temperature between 32 and 45 F. If the load is less than the minimum step indicated above, a hot gas bypass valve meters hot gas into the outdoor air coil to provide an additional load to the system. This keeps the compressor on the line and prevents the coils from icing up due to low suction temperature.

Since the outdoor air coil would become a condenser when the ambient temperature is below the suction temperature, a thermostat closes the outdoor air damper if the ambient drops below 32 F and compressors are operating. If there is no airflow across the outdoor coil, there is no heat transfer and the coil becomes an extension of the refrigerant piping.

Head pressure is maintained by cycling one or 2 condenser fans with a condensing pressure switch and modulating the remaining fan with a Motormaster® solid state speed controller, permitting operation of the refrigerant system to -20 F ambient. The Carrier modular design is not dependent on an economizer cycle for cooling at low outdoor temperatures. (A factory-installed economizer option is available.)

All multizone units function satisfactorily in the full cooling or full heating mode. However, at

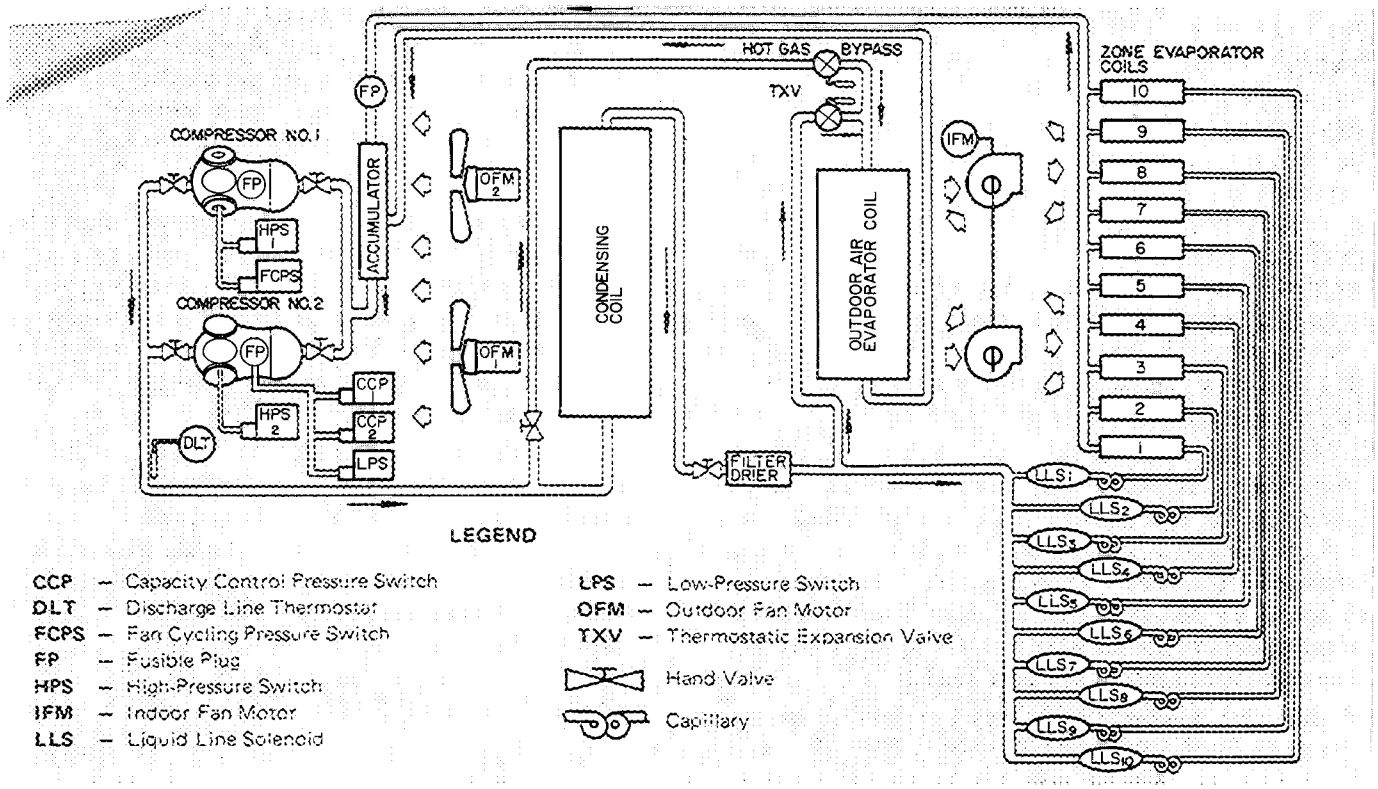


Fig. 1 – Refrigerant Piping Schematic (10-Zone Units Shown, 8- and 12-Zone Units Similar)

partial load operation, difficulties arise in conventional hot deck/cold deck units. When some zones are at full heat, some at partial heat, some at partial cooling, conventional multizones must operate the hot and cold decks simultaneously at high energy cost. The Carrier Modular design satisfies each zone's demand by a discrete module(s). There are no hot decks, cold decks or zone air mixing dampers to waste energy. The only energy expended is that required to heat or cool the individual zone. Since there is no mixing, energy is saved and operating costs are significantly lowered. In addition, the control system provides excellent humidity and temperature control. Multistage cooling is available on larger zones where 2 or more modules are used for efficient control of zone space requirements.

The following features and safety devices are provided on the refrigerant cycle:

1. Suction line accumulator
2. Crankcase heaters
3. High- and low-pressure switches
4. Discharge line thermostat
5. Time Guard® circuit
6. Airflow switch for indoor fan motor
7. Internal motor protection thermostats embedded in compressor motor windings
8. Hot gas bypass capability
9. Compressor unloading capability
10. Filter-driers

PSYCHROMETRICS – The 48MA/50ME units differ psychrometrically from the conventional multizones due to the operation of the outdoor air coil. The coil in the Carrier units cools and dehumidifies the outdoor air entering the unit thus assuring that raw outdoor air is not passed along to the zones. This air treatment by the outdoor air coil (and also by the zone module evaporator coils) provides excellent low load performance and precise temperature control to the conditioned space. The only large load variation occurs on the outdoor air coil where a thermal expansion valve is used. This allows the use of simple capillary tube expansion devices on the zone coils. The zone coils cool and dehumidify a mixture of return air and outdoor air – outdoor air at the approximate dew point temperature of the return air.

The psychrometric chart (Figure 2) illustrates this air treatment for a typical set of conditions. As an example: 1000 cfm of outdoor air at 95 F/75 F having 99 grains moisture content enters the outdoor air coil and is cooled and treated so that the air leaving the coil has 68 grains of moisture content. The outdoor air coil under these conditions has a capacity of 60,000 Btuh of which 39,000 Btuh is sensible. This is a coil sensible heat factor of 0.65. By examining the room conditions, it is evident that the outdoor air coil is very effective in removing the latent load. At 75 F/50%, the room content is 64 grains of moisture. The percent moisture removed with respect to room conditions is:

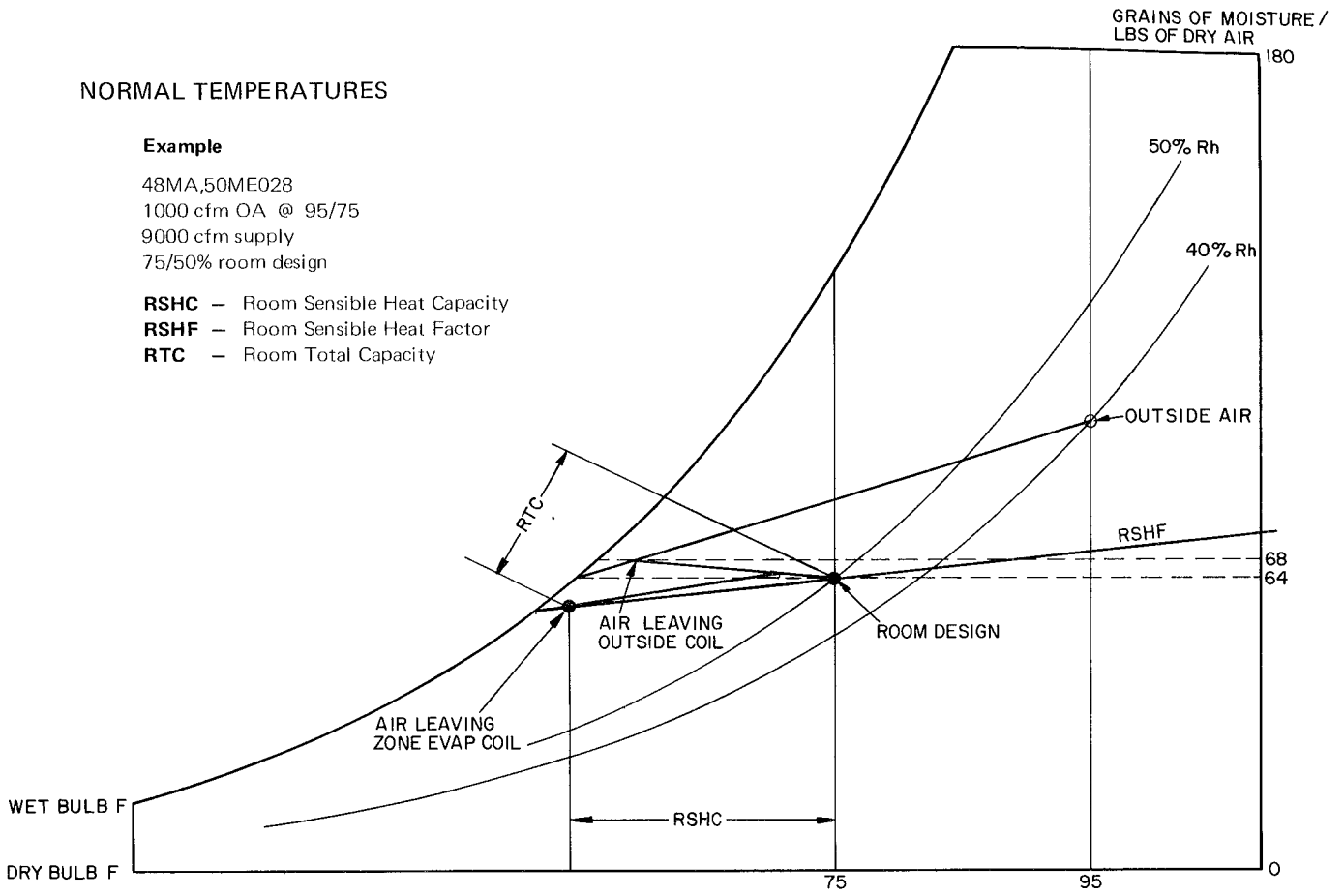


Fig. 2 – Psychrometric Chart – Example

$$\% \text{ removed } \frac{99-68}{99-64} \times 100 = \frac{31}{35} = 88.5\%$$

The 1000 cfm of outdoor air at 68 grains is mixed with 8000 cfm of return air at 75 F/50% room conditions (64 grains). This mixture then enters the zone modules and is cooled and dehumidified by the zone coil.

Heating (General) – The 48MA/50ME modular multizone units offer a wide range of factory-installed heating options.

In all cases, the modular design provides a number of small heating steps to maintain very close discharge temperature control without wide variation. Conventional multizones cycle a few large increments to maintain the necessary hot deck temperatures and, thus, cannot control discharge temperature as well as the modular units.

Another feature of the modular design is the reduced impact of heater malfunction. Any unit can have a malfunction – such as an open coil in a relay or contactor or gas valve failure in a gas-fired unit. The Carrier 48MA/50ME units, with 8, 10 or 12 independent heating sections, would experience heat failure in one module only and all others would operate normally. Conventional multizones could lose a large percentage of heating capacity or the entire heat source in the hot deck could become inactive.

The Carrier modular multizone units are designed to provide reliability, serviceability, operating economy and comfort control – features difficult to match with conventional hot deck/cold deck reheat multizone units.

GAS HEATING SYSTEM (48MA) – Each module has a 2-stage burner, with one pilot per pair of modules. The first-stage gas valve (115-v) controls gas flow to the main orifice and to the second-stage valve. A 24-v solenoid valve provides gas to the second stage when open (see Fig. 3). Both heating stages are contained in one valve body.

The gas heating section has standing pilots and continuous forced draft combustion. The pilots have automatic spark relight for dependable ignition.

The 48MA modular multizone has individual 18 ga Chromized steel heat exchangers and stainless steel main burners in each module.

Safety features on the heating system include:

1. A.G.A. certification of the entire unit design as well as the furnace section.
2. Airflow switch for indoor fan motor.
3. Airflow switch for forced draft fan motors.
4. Door switch for combustion compartment.
5. Pilot switch to ensure a pilot flame

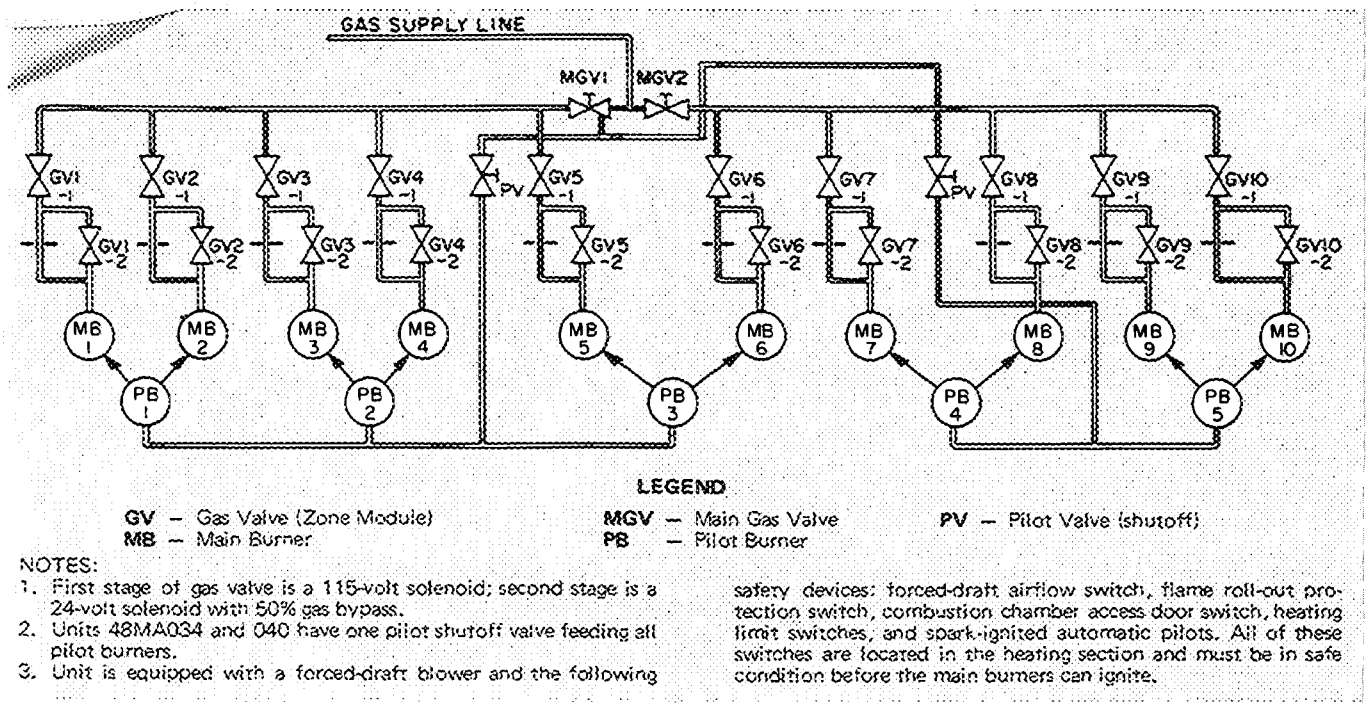


Fig. 3 – Gas Piping Schematic (10-Zone 48MA Unit Shown, 8- and 12-Zone Units Similar)

6. Heating limit switches.
7. Flame rollout protection switch.

In special applications where natural gas supply is limited, units must be modified to operate under derated input/output conditions. The 48MA modular multizones can be derated by changing the zone module burner spuds and gas valve orifices as follows:

NATURAL GAS FIRED UNITS

TOTAL MODULE DERATED INPUT (%) High Fire/Low Fire	SPUD SIZE	GAS VALVE ORIFICE SIZE
100/50	No 36	No 36
90/45	No 38	No. 38
80/40	No 41	No. 41
70/35	No 43	No 43

Under these conditions, the units still have 2 stages of derated heat input. Derating below these limits is not approved. If single-stage heat is acceptable, disconnect high fire stage to permit each module low fire input only (% as shown under low fire).

Contact Carrier Service Department before derating to the above limits.

ELECTRIC HEATING SYSTEM (50ME) – The 50ME electric heating system contains single-phase Nichrome wire coils (see Fig. 4), wired and phase balanced to provide 2 or 3 steps of heat control. Each zone has 2 or 3 steps of strip heat available, controlled simultaneously by the zone thermostat and the outdoor air thermostat. When heat is required, the first stage of zone thermostat energizes the first step of zone heating. The second step (on 3-step units) of heating is controlled by the second stage of the zone thermostat. The second (on 2-stage units) and third step of heating is controlled by the outside air thermostat (OAT.) and operates simultaneously with the second stage of the thermostat (on 3-stage units) when the outside air temperatures are below OAT. setpoint. The setpoint on the outside air thermostat is adjustable from 0 to 55 F.

Safety features include:

1. UL certification on entire unit, as well as electric heat section
2. Manual reset circuit breakers
3. Klixon high-temperature protection
4. Airflow safety for indoor fan motor
5. Fusible links in each heater phase
6. Two-pole contactors on each element

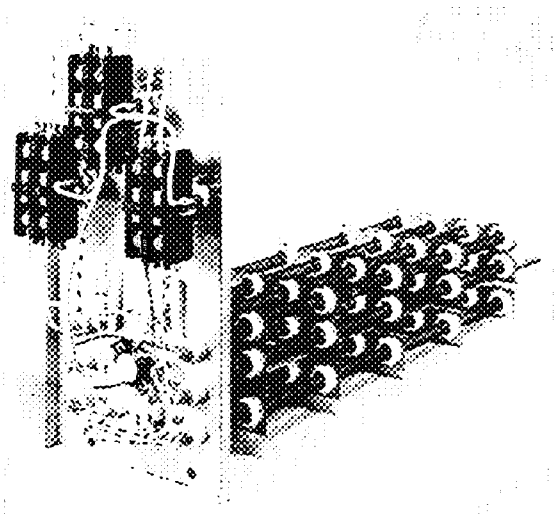


Fig. 4 – Electric Heating Unit (50ME)

HOT WATER/GLYCOL HEATING SYSTEM – Hot water is a frequent selection for heating due to simplicity of the piping system, the ease in maintaining uniform temperature control and quieter operation. In addition, when renovating an existing building, a hot water heating plant is usually available.

Carrier's hot water/glycol heating option (Fig. 5) is ideally suited for these renovations. Each zone module has its own high capacity heating coil. All controls, solenoid operated shutoff valve and balancing valves are included in the option. There is no internal piping or wiring; only one connection is required for supply and return hot water/glycol. The option does not include internal pressure relief for partial load operation. External piping to the unit must be in accordance with existing codes. It must include proper relief for water flow (the maximum allowable hot water/glycol system working pressure is 30 psi.) or a modulating control to compensate for decrease in water flow rate to zone coils under partial load conditions when some coils are cycled closed. System heater coils are designed for operation with a water/glycol solution of 20% minimum glycol for proper freeze-up protection. Figure 35 located in the Heating Capacity Section, page 47 portrays an example of selecting and rating hot water/glycol heating coils for use with 50ME multizone units.

The hot water/glycol option is not intended for use on a steam system. Where steam is the only heating medium available, a steam-to-water converter or a steam-to-water interchanger should be used.

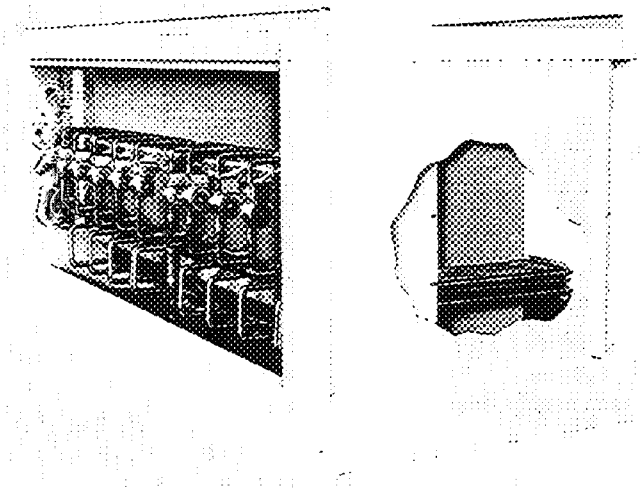


Fig. 5 – Hot Water/Glycol Heating (50ME)

SYSTEM SELECTION AND OPERATION

To better understand the actual operation of the modular multizone, a typical design example is provided.

Refer to Carrier's Engineering Guide for Multizone Unit Systems and contents of this booklet for typical multizone design considerations. Using the Engineering Guide, calculate cooling and heating load estimates for the areas to be served by the multizone unit. Divide each area into zones based on the peak load and control requirements within the area.

The resulting loads in a typical building have been calculated as follows:

Cooling

Grand Total Load (GTL) . . . . . 275,000 Btuh
Sensible Load (SL) . . . . . 215,000 Btuh
Room Design . . . . . 75 F db/50% Rh
Outdoor Air (OA) Cfm 1000
OA Ambient Temperature . . . . 95 F db/75 F wb
Electric Power Source 460/3/60

Zone No.	Room Total Load* (RTL)/Zone	Room Sensible Load (RSL)/Zone
1	19,000 Btuh	16,935 Btuh
2	25,000 Btuh	22,505 Btuh
3	25,000 Btuh	22,505 Btuh
4	70,000 Btuh	59,160 Btuh
5	22,000 Btuh	19,720 Btuh
6	25,000 Btuh	22,505 Btuh
7	40,000 Btuh	33,870 Btuh
Total	226,000 Btuh	197,200 Btuh

*Loads are peak loads.

Heating (Electric Resistance Heat required)

Zone No	Heating Load/Zone	Electric Resistance/Zone
1	34,000 Btuh	10.0 kw
2	44,000 Btuh	12.9 kw
3	44,000 Btuh	12 9 kw
4	111,000 Btuh	32.5 kw
5	42,000 Btuh	12.3 kw
6	44,000 Btuh	12 9 kw
7	81,000 Btuh	23 7 kw
Total*	400,000 Btuh	117 2 kw

*Zone Peak Capacities.

Selection:

Due to the many heating options and ranges on each 48MA/50ME unit, multizone unit selection is normally based on cooling load requirements. Enter the 48MA/50ME rating tables in the Performance Data Section and select the unit that meets or exceeds the grand total load at the specified conditions. (Interpolation may be necessary to obtain unit rating at certain conditions; extrapolations are not advised. Contact Carrier Engineering for performance data at points beyond the range of published tables.) The 024 size unit does not have sufficient capacity to meet load requirements at any cfm. The 028 size exceeds load requirements; however, it is the smallest unit that meets specifications. Thus, the 48MA/50ME028 at: 9000 cfm; 1000 cfm OA; 95 F/75 OA temperature; and 75 F/50% Rh room design has a TC of 282,000 Btuh, SHC of 219,000 Btuh, compressor kw of 27.5 and a RSHF of .835. Calculate the RTC and the RSHC by deducting the outdoor air load from the unit capacity.

The outdoor air load with respect to room conditions is as follows:

Outdoor air
total heat (OATH) = 4.5 ($h_{oa} - h_{room}$) (OA cfm)
= 4.5 (38.61 – 28.29) (1000)
= 46,440 Btuh

Or, a graph, shown in Fig. 6, can be used to find the OA load factor, 4.5 ($h_{oa} - h_{room}$), for all conditions illustrated in the 48MA/50ME rating tables (Performance Rating Section). Thus,

OATH = (OA load factor) (OA cfm)
= (46.5) (1000)
= 46,500 Btuh

which agrees with the above calculation.

Outdoor air
sensible heat (OASH) = 1.09 ($t_{oa} - t_{room}$) (OA cfm)
= 1.09 (95 – 75) (1000)
= 21,800 Btuh

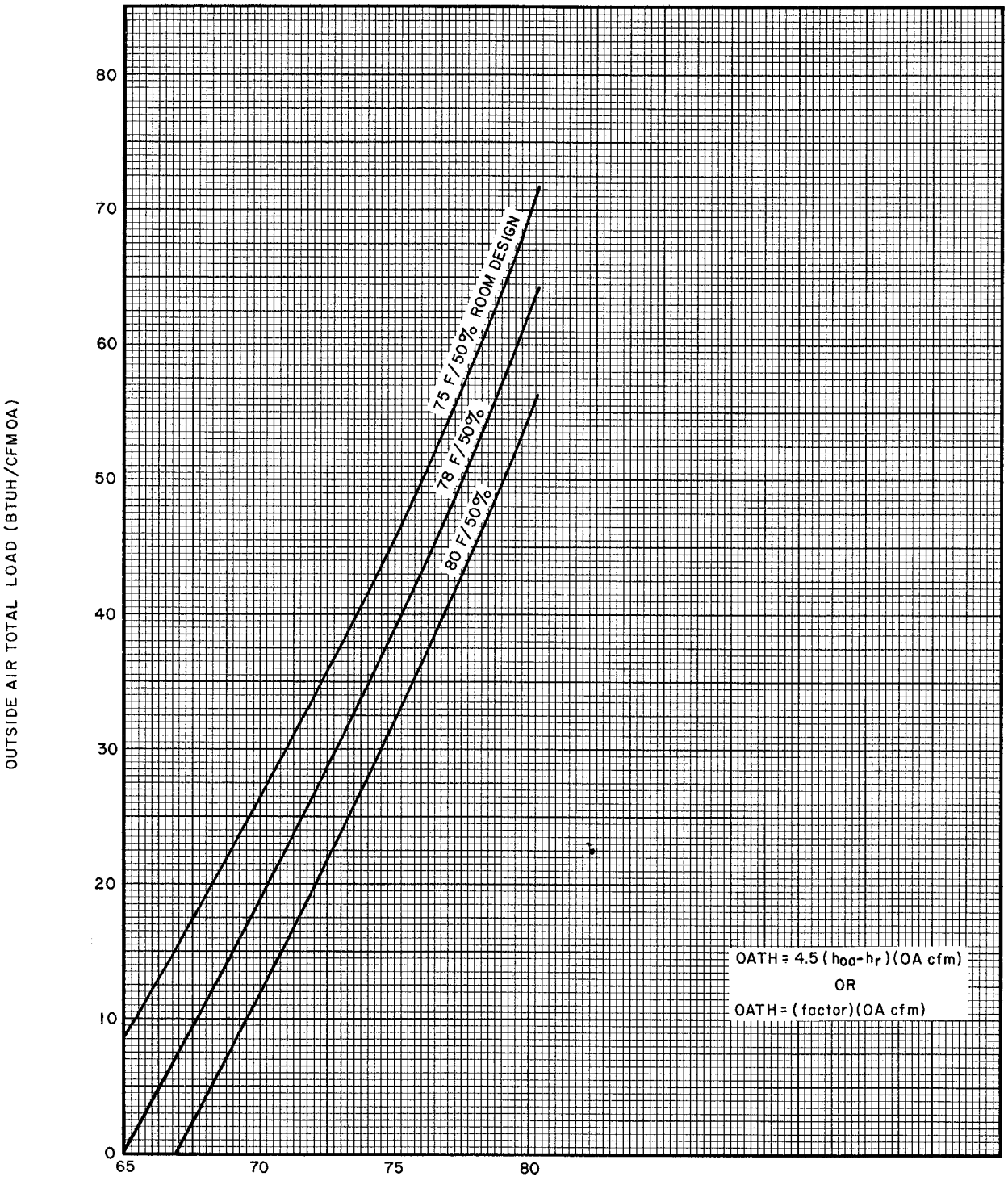


Fig. 6 – Outdoor Air Load Selection Chart

The unit capacity available to offset room loads is.

Room TC = Unit TC – outdoor air TC
= 282,000 – 46,500
= 235,500 Btuh

Room SHC = Unit SHC – outdoor air sensible heat
= 219,000 – 21,800
= 197,200 Btuh

For comparison:

Load		Unit Capacity	
GTL	= 275,000 Btuh	TC	= 282,000 Btuh
SL	= 215,000 Btuh	SHC	= 219,000 Btuh
RTL	= 226,000 Btuh	RTC	= 235,500 Btuh
RSL	= 197,200 Btuh	RSHC	= 197,200 Btuh

The 48MA/50ME size meets or exceeds the total and zone load requirements at the specified conditions. The excess RTC decreases space average relative humidity slightly below the room design of 50%. By increasing air quantity above 9000 cfm, this excess latent capacity can be converted to additional sensible capacity if desired.

Since the modular multizone is a constant volume machine, the selected supply cfm per zone must be proportioned to satisfy each zone's peak load condition.

Room sensible capacities (RSC) are divided equally among the modules if an equal cfm is going to each. In this example, the 48MA/50ME028 has 10 modules and the nominal cfm is 900 cfm per module.

The cfm to each zone can be varied (with field-supplied manual dampers in zone ducts) to match different zone requirements, but since the original rating was based on 9000 cfm supply air, all variations must total 9000 cfm. The effects of changing cfm quantities on room TC and room SHC in each module are shown in Fig. 7. When the cfm is changed (by some percent) from the nominal in a specific module, then the room capacity multipliers in Fig. 7 are used to correct room TC and room SHC. Capacity versus cfm changes for the example is given in Table 2.

By analyzing each zone's ratio of deviation from equal sensible heat allocation, the proper cfm change is determined. In the example, if building room SHC is 197,200 Btuh and 10 zones are used, each zone's normal room SHC is 19,720 Btuh. But if zone 3 has 22.505 Btuh room SHC, then by ratio of 22,505 : 19,720 or 1.14, the cfm change is +20% (see Fig. 7). Correspondingly, if zone 1 had 16,935 Btuh room SHC, the cfm change is -20%.

In applications where the zone selection is not an increment of the number of unit modules (i.e. one zone requiring 500 cfm in a 48MA/50ME028 with 10,000 cfm), refer to Module Cfm Limits, page 10, for details on using cfm's below 600 cfm/module.

Formulas required to use ratings are:

Outdoor Air Total Heat (OATH)

$$OATH = 4.5\,(OA\ cfm)\ (h_{oa} - h_{room})$$

Outdoor Air Sensible Heat (OASH)

$$OASH = 1.09\,(OA\ cfm)\ (t_{oa} - t_{room})$$

Room Total Capacity (RTC)

$$RTC = Unit\ TC - OATH$$

Room Sensible Heat Capacity (RSHC)

$$RSHC = Unit\ SHC - OASH$$

Room Sensible Heat Factor (RSHF)

$$RSHF = \frac{RSHC}{RTC}$$

Leaving Air Temperature (LAT)

$$LAT = room\ temperature - \frac{RSHC}{1.09\ cfm}$$

Determine Heating Capacity:

The specified requirement for electric heat dictates the selection of a 50ME028 unit with a kw option that meets or exceeds the heating load.

Table 9, page 50 indicates that the 028 unit has heating capacity options of 66, 88 and 132 kw. The 132 kw option is selected as it provides adequate heat for this application. The kw/zone and number of heat stages available are:

Zone No.	Load	Zone Heating Capacity	Stages of Heat
1	10.0 kw	13.2 kw	3
2	12.9 kw	13.2 kw	3
3	12.9 kw	13.2 kw	3
4	32.5 kw	39.6 kw	9
5	12.3 kw	13 2 kw	3
6	12.9 kw	31.2 kw	3
7	23.7 kw	26 4 kw	6
Total	117.2 kw	132.0 kw	30

Stages of heat are controlled individually in the small zones or collectively in large zones to provide flexible and continuous control for each zone.

Table 2 – Capacity vs Cfm Changes

ZONE NO.	NO. OF MODULES	RSL/ZONE PEAK LOAD	% DEVIATION (RSL/NOM UNIT RSHC)	% CFM CHANGE FROM NOMINAL	CFM	UNIT TOTAL CAPACITY MULTIPLIER*	X	UNIT NOMINAL RTC/ZONE	ADJUSTED UNIT RTC
1	1	16,935	16,935/19,720 = .86	-20	720	9	×	23,550	21,195
2	1	22,505	22,505/19,720 = 1.14	+20	1080	1 1	×	23,550	25,905
3	1	22,505	22,505/19,720 = 1.14	+20	1080	1 1	×	23,550	25,905
4	3	59,160	59,160/3 × 19,720 = 1.00	0	2700	1 0	×	3 × 23,550	70,650
5	1	19,720	19,720/19,720 = 1.00	0	900	1.0	×	23,550	23,550
6	1	22,505	22,505/19,720 = 1.14	+20	1080	1.1	×	23,550	25,905
7	2	33,870	33,870/2 × 19,720 = .86	-20	1440	.9	×	2 × 23,550	42,390
	10	197,200			9000				235,500

*Unit total capacity multiplier is obtained from Fig. 7. Use % change from nominal and read multiplier from graph.

RSHC – Room Sensible Heat Capacity **RSL** – Room Sensible Load **RTC** – Room Total Capacity

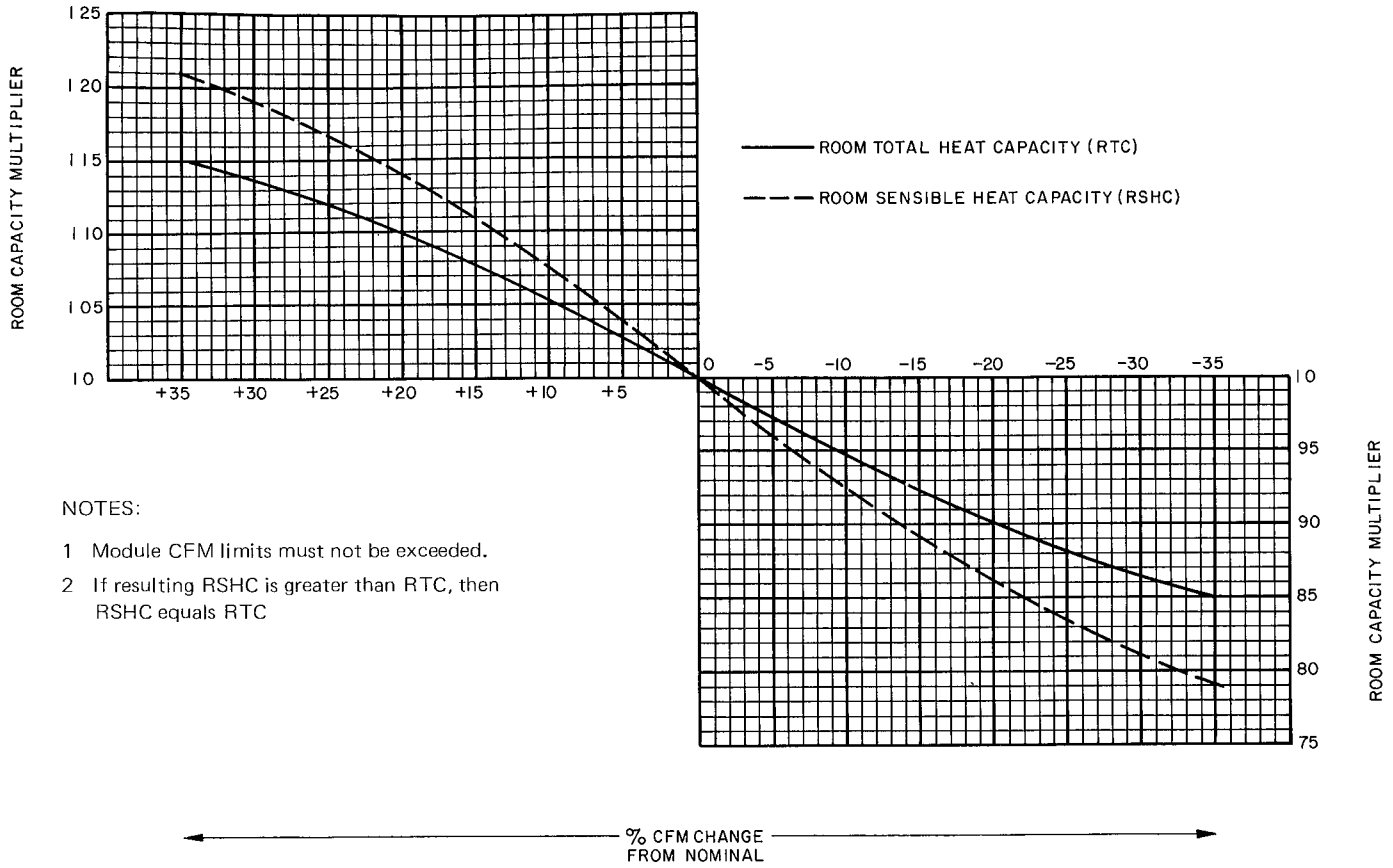


Fig. 7 – 48MA/50ME Room Capacity Multipliers

Power Wiring Data – The 50ME028, 460-3-60 unit with 132 kw of electric resistance heat, has a 75.8 cooling circuit minimum wire ampere and a heating circuit minimum wire ampere of 207.0. If any module is operating on mechanical cooling (compressor operating), one heating stage in each module is locked out and cannot be energized. This, a common feeder can be sized for minimum wire ampere of 221 (see Fig. 37).

APPLICATION

Diversity – The size, shape and orientation of the building – as well as the application and location of zones, influence the degree of diversity that may be applied to a multizone system.

Since the normal application of multizone units involves zones where loads are shifting due to solar energy, people, equipment and lights, diversity will exist.

The Carrier modular multizones will be affected by building diversity only on the refrigeration system. When a particular zone (or zones) thermostats are satisfied, a solenoid shuts off the zone evaporator coil. This enables more refrigerant to flow to other operating zone coils, creating a larger capacity for that zone. However, the diversity will lower the selected unit total capacities.

The 48MA/50ME ratings do not reflect diversity but can be converted to diversity ratings by using the capacity correction factors and formulas in Table 3.

Table 3 – Capacity Correction Factor (CCF)

LOAD	DIVERSITY FACTOR		
	1.0	90	.80
TC (Unit)	1 0	97	94
SHC (Unit)	1 0	94	89

$$\text{RTC (with diversity)} = \frac{[\text{TC (CCF)} - \text{OATH}]}{\text{(Diversity Factor)}}$$

$$\text{RSHC (with diversity)} = \frac{[\text{SHC (CCF)} - \text{OASH}]}{\text{Diversity Factor}}$$

This is accomplished by rating the unit assuming that no more than 9 of 10 zones would be on at one time, 90% diversity. The same logic applies to other diversity factors on an average basis, such as 85 or 95%.

A rating with a diversity factor results in a lower room SHF; therefore, a reselection at a higher total unit cfm is advisable to take full advantage of the building diversity.

Limitations

MODULE CFM LIMITS AND FAN PERFORMANCE – The cfm limits per zone are 1200 cfm maximum and 600 cfm minimum. The

outboard zones in the 8-, 10- and 12-module units are limited to a maximum of 1000 cfm. The maximum limit is necessary to prevent blow-off to the heat exchangers and into the ductwork. The minimum limit prevents burner cycling on limit switches and prevents electric heater cycling. At reduced cfm's, zone evaporator coils overfeed refrigerant, but there is no liquid flood-back to the compressor as it is protected by a suction line accumulator.

For applications below 600 cfm, it is recommended that the heating controls be modified as follows:

Gas fired (300 to 599 cfm) – Use first-stage heat only, deactivate second stage.

Electric Resistance (450 to 599 cfm) – Use first- and second-stage heat on 3-stage units.

Electric Resistance (300 to 449 cfm) – Use first-stage heat on 2- or 3-stage heat units.

Optimum performance is delivered in the 800 to 1000 cfm range. Extremely low cfm requirements reduce unit cooling capacity. Low zone cfm applications may also be handled by sizing the zone for a higher cfm (to increase unit efficiency) and diverting the extra air into the return air system or a larger interior space. Extra air should not be diverted into spaces with different perimeter wall orientations.

Fan performance data, Table 4 and Fig. 32, 33 and 34, (Fan Curves) are located in the Fan Performance Section and are based on 15% outdoor air. When the outdoor air dampers are closed and there is no outdoor ventilation air into the unit, unit cfm is reduced by 2 to 6%. This reduction is due to the static pressure drops existing in the separate airflows thru the unit. This reduction should be considered in special applications where little or no ventilation is required and cfm requirements are critically designed.

MAXIMUM VENTILATION LIMITS – Under normal mechanical cooling, the amount of ventilation air that can be introduced is a function of the outdoor air damper setting and negative static pressure at the return air intake of the unit. Figures 8 thru 11 show ventilation air versus negative static pressure at various settings of the outdoor air damper. A 5.5 setting of the ventilation control dial is the maximum opening of the dampers. The ventilation dial can be set in any position from 0 to 5.5 to obtain the desired cfm of outdoor air. The ventilation dial is located on the control panel adjacent to the heating section.

Reheat Applications – A space with a high latent load and a very low sensible load may require reheat capability for dehumidification. Typical spaces of this type are conference rooms or visual aids rooms where people congregate with the lights out.

Reheat control is achieved on the 48MA/50ME unit by wiring a humidistat (Fig. 12) in parallel with the cooling thermostat on any zone requiring reheat capability. This may be done on one module or all modules. When using reheat control on electric resistance heat units, extreme care must be exercised with power wiring as heating and cooling can operate simultaneously in each module.

When the zone's humidity level reaches the setpoint of the humidistat, mechanical refrigeration is activated for that zone module and the air is dehumidified and then reheated on thermostat demand before being discharged to the zoned space.

The 48MA/50ME Economizer – The 48MA/50ME units can be equipped with an economizer control. The control functions as follows: with ambient temperatures above the economizer changeover point, the outdoor air damper is set at the ventilation position, cooling is accomplished by the compressors when the room thermostat calls for cooling. If the zone is not calling for cooling, the mixed air is circulated thru the space. When the ambient temperature drops below the economizer changeover point, the compressors are locked out and the damper motor is under control of a mixed air thermostat to maintain a mixed air temperature low enough to provide cooling when the room thermostat demands it. (See Fig. 13.)

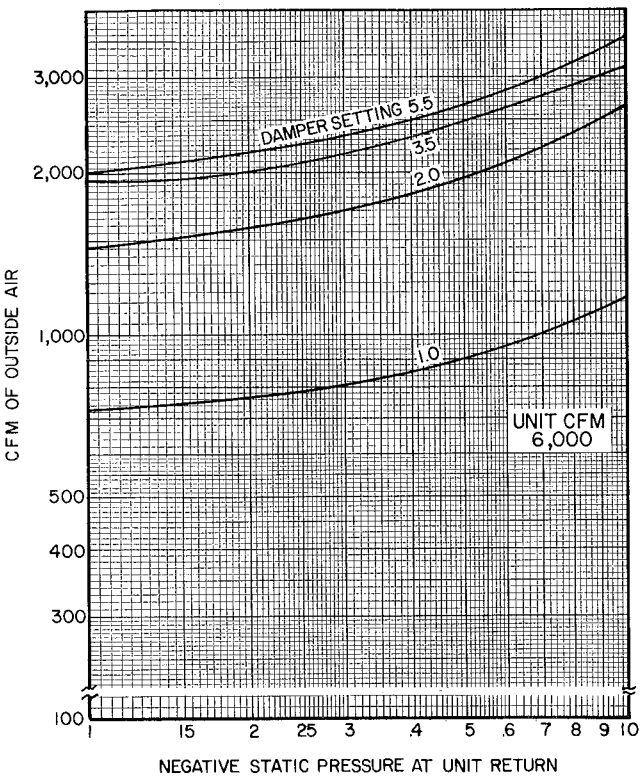


Fig. 8 – Ventilation Air Chart, 48MA/50ME016

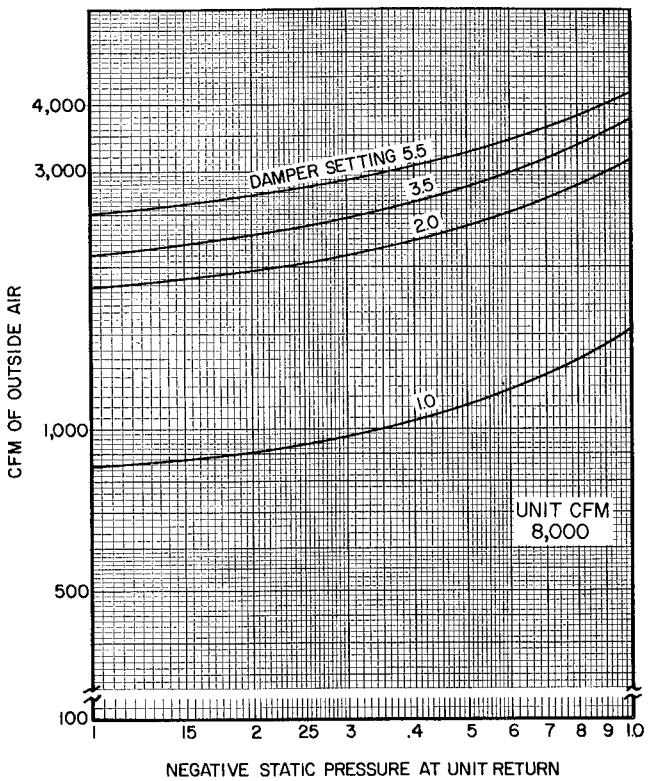


Fig. 9 – Ventilation Air Chart, 48MA/50ME024

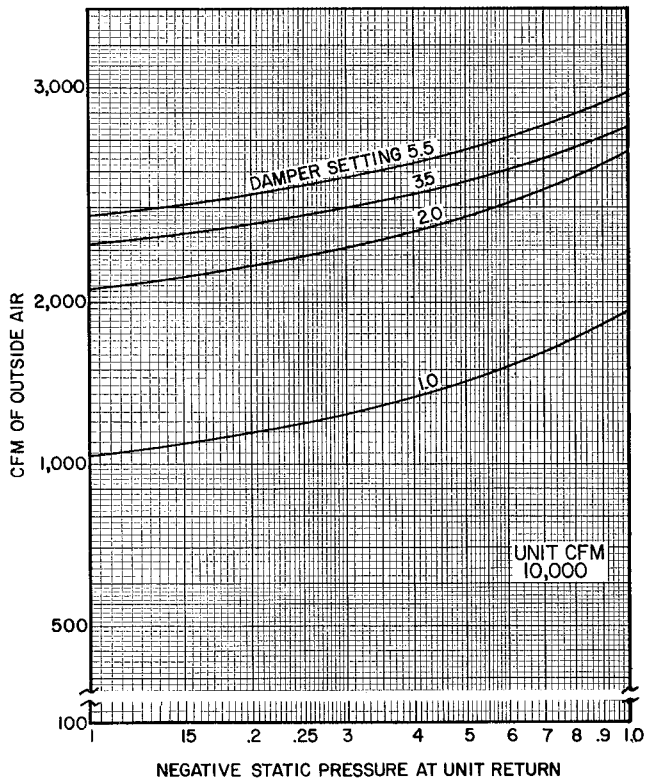


Fig. 10 – Ventilation Air Chart, 48MA/50ME028,030

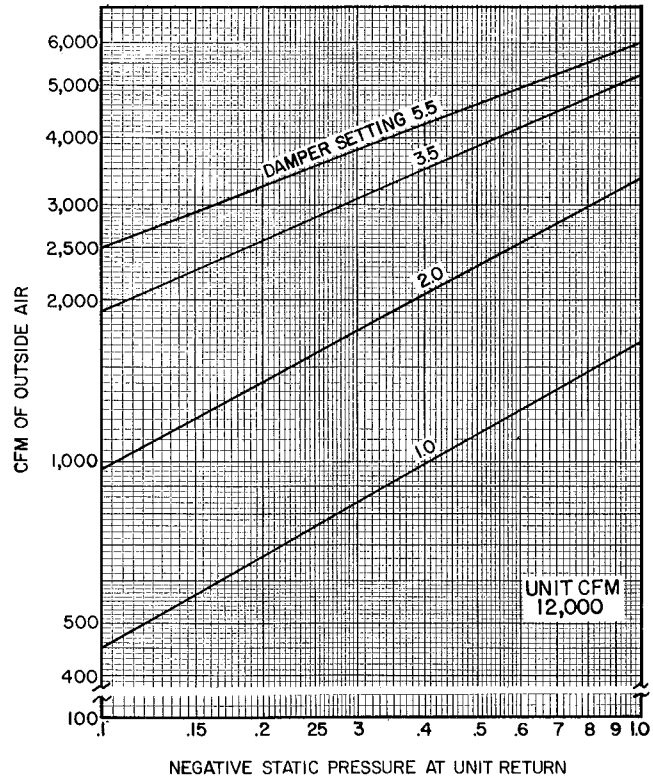
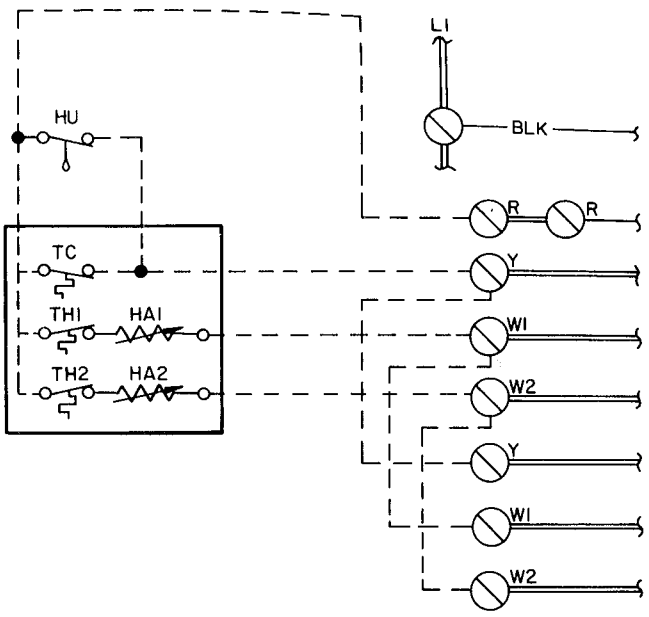


Fig. 11 – Ventilation Air Chart, 48MA/50ME034,040

If a zone thermostat calls for cooling while in economizer mode, a set of cooling relay (CR) contacts close, energizing the economizer relay (ECR). See Fig. 14. The ECR is a DPDT plug-in relay. For economizer damper control, the ECR locks out the outside air damper adjustable potentiometer and shifts the damper control to a Mixed Air Thermostat (MAT.). The MAT. sensor, located in the fan section, adjusts the outside air damper to maintain a preset mixed air temperature (see Fig. 15).

The 48MA/50ME economizer operation provides economic use of outdoor air for low-cost cooling. When all zone cooling thermostats are satisfied, economizer controls are bypassed and the outdoor dampers are modulated to the minimum ventilation position. The mixed air temperature increases, minimizing the amount of reheat required in other zones that require heating.

Refer to Economizer Economics, page 15 to determine if the addition of an economizer is justified.



LEGEND

HA	– Heat Anticipator	⊘	Screw Terminal
Hu	– Humidistat	═══	Printed Circuit
TC	– Thermostat, Cooling	———	Factory Control Wires
TH	– Thermostat, Heating	– – – –	Field Wiring

Fig. 12 – Humidistat Connections

SEQUENCE:

1 – Ambient temperature decreases
2 – Compressor is locked out by economizer control thermostat
3 – Outside air damper is regulated by mixed air thermostat to maintain fixed mixed air temperature

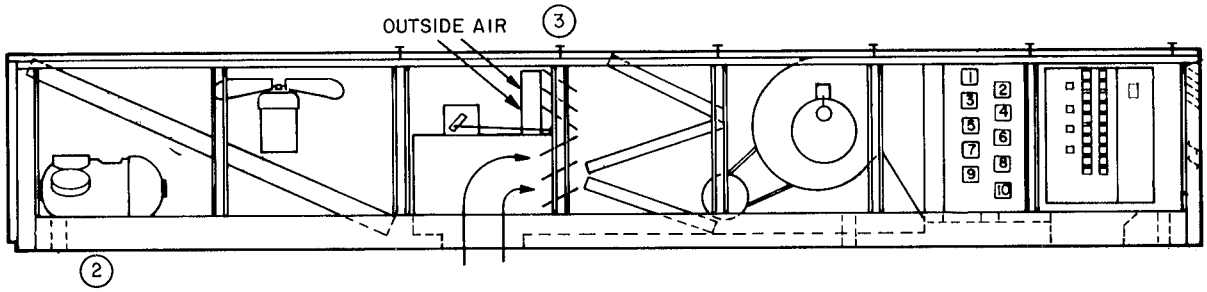
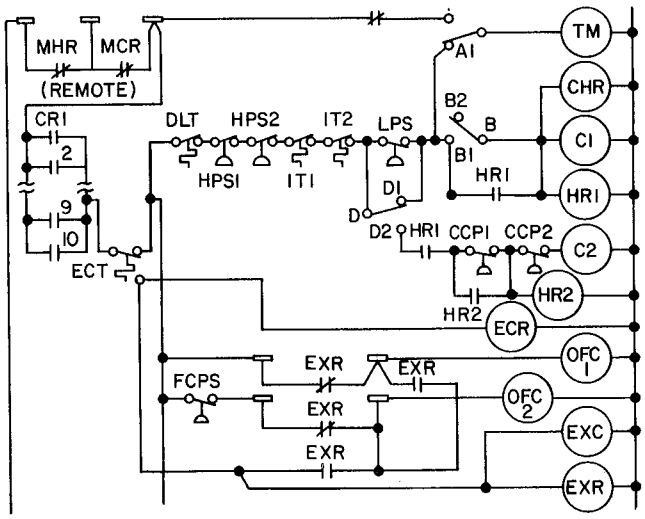


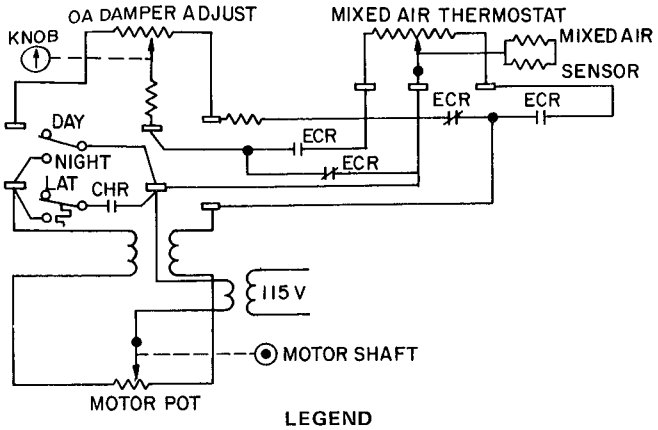
Fig. 13 – Economizer Operation



LEGEND

C	–	Compressor Contactor
CCP	–	Capacity Control Pressurestat
CHR	–	Crankcase Heater Relay
CR	–	Cooling Relay
DLT	–	Discharge Line Thermostat
ECR	–	Economizer Relay
ECT	–	Economizer Thermostat
EXC	–	Exhaust Motor Contactor
EXR	–	Exhaust Relay
FCPS	–	Fan Cycling Pressurestat
HPS	–	High Pressure Switch
HR	–	Holding Relay
IT	–	Internal Thermostat
LPS	–	Low-Pressure Switch
MCR	–	Master Cooling Relay
MHR	–	Master Heating Relay
OFC	–	Outdoor Fan Contactor
TM	–	Timer Motor

Fig. 14 – Economizer Condensing Schematic



LEGEND

CHR – Crankcase Heater Relay
ECR – Economizer Relay
LAT – Low Ambient Thermostat
OA – Outside Air

Fig. 15 – Economizer Damper Control Schematic

Economizer And Exhaust Performance – An economizer can be readily factory installed on the 48MA/50ME since the damper motor and outdoor air damper are standard equipment. The economizer package consists of a return air damper, linkage, plug-in relays, MAT. wiring, and mixed air thermostat.

When the 48MA/50ME unit is on full economizer control, the supply cfm to the space drops off slightly since the resistance of the outdoor air intake is generally greater than that of the return air ductwork. To partially offset this, the return air dampers have a built-in bypass.

With the outdoor air dampers fully open and the return air dampers fully closed, the total cfm drops 15%. The total cfm consists of 70% outdoor air and 30% return air thru the built-in bypass. If, for example, the unit normally operates at 10,000 cfm supply air, the minimum supply cfm when the economizer is operational is 8500. This 8500 cfm consists of 6000 cfm outdoor air and 2500 cfm return air. As the ambient temperature drops from 48 F (recommended economizer setpoint), the proportion of outdoor air to the supply air required to maintain mixed air temperature is less, the outdoor air damper begins to close, and return air damper begins to open (see Fig. 13). As this happens, total supply cfm progressively increases from 8500 cfm to 10,000 cfm (design).

An exhaust damper option is also available for use with the economizer. It is located between the return air plenum and the condenser fans. The option consists of a TPDT plug-in relay (EXR), an exhaust damper, and a plug-in jumper. The damper provides a forced exhaust of indoor air during the economizer operation. The exhaust damper opens when the return air damper is 25% closed. With the damper installed, ECR and EXR are energized simultaneously. The EXR locks out outdoor fan motor (OFM) controls (32LT on OFM1 and FCPS on OFM2 and OFM3) and outdoor (condensing) fan motors operate at full speed, discharging excess return air to the atmosphere thru the open exhaust damper (see Fig. 16).

The 48MA/50ME exhaust operation is similar in performance to a relief damper except that the exhaust dampers are mechanically linked to the return air dampers and the condenser fans operate to produce a pressure differential which aids the exhaust cycle. At approximately 0 in. wg at the return air opening, the 48MA/50ME units exhaust between 150 to 200 cfm/ton. With positive return static, more air is exhausted. At -0.40 in. wg (.25 in. wg on the 016 unit) return air static, exhaust capabilities of the units drop to zero.

In the example, the 4000 cfm exhausted at 0 in. return static accounts for all but 1100 cfm outdoor air introduced by the economizer outside air section. In practice, this excess cfm is considered a nominal ventilation rate, slightly pressurizing a building to eliminate drafts and unwanted air seepage. This excess air filters out of the building thru doors and window spaces. The slight positive pressurization of the building aids the exhaust fans in removing air. If, however, the balance between the building static and exhaust system leaves the building with unacceptably high positive static pressures, a relief ventilator or roof power exhauster may be used. For extensive or

SEQUENCE:

1 – Return damper closes 25%.
2 – The exhaust damper opens
3 – The OFM (condensing fans) speed controls are bypassed and fans run full speed, exhausting return air to atmosphere

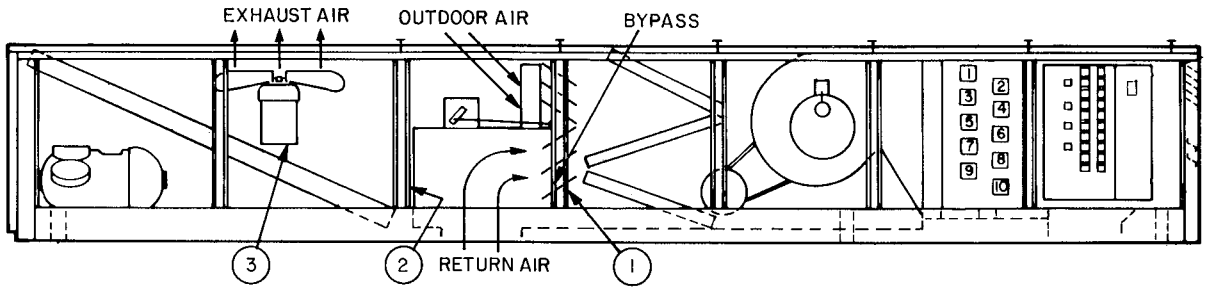


Fig. 16 – Exhaust Damper Operation

complicated return air duct systems with static pressure greater than -0.2 in. wg at the return air plenum, duct mounted return air exhaust fans can be installed for proper airflow. However, return air exhaust fans add to the operating cost and increase noise level. More efficient duct design methods should be investigated to eliminate the need for special return air exhaust fans.

Economizer Economics – Economizer control on a multizone unit does not necessarily reduce operating cost as it would on a single zone unit. A single zone unit either heats or cools; a multizone unit can do both simultaneously. Therefore, in a multizone, the economizer operates to maintain a mixed air temperature low enough to cool a zone with a high internal load. The remaining zones requiring less cooling or heating must have heat added to offset cooling capacity available but not needed. This is true of any multizone with any type of control system.

The amount of heat required to neutralize the overcooling capacity is dependent on:

1. The percent cooling capacity required from the unit, and
2. The mixed air temperature required to satisfy the zone with the highest internal load.

As the ambient temperature drops, the percent of outdoor air needed to maintain a mixed air temperature is less. Since the reheat or wasted heat added is a function of the difference between outdoor air introduced and ventilation rate, operating cost is reduced at lower ambients. A high ventilation rate also reduces the reheat requirement and associated cost. The following example illustrates the need for a careful analysis of job requirements before arbitrarily selecting on economizer control.

Example:

A 48MA/50ME unit is operating with economizer control and supplying 10,000 cfm of 55 F mixed air. The normal ventilation rate is 2000 cfm. Assuming a realistic cooling load of 50%, 5000 cfm of the 55 F air is used for cooling. Since the ventilation rate is 2000 cfm, half is sent to the cooling zones leaving 4000 cfm of low-cost cooling. The remaining 5000 cfm of 55 F air, including 1000 cfm of ventilation air, is going to zones with either no load or a heating load and must be neutralized.

Although 4000 cfm or low-cost cooling is obtained, an extra 4000 cfm of air must be heated to some degree above and beyond that in a unit without economizer controls.

For an identical unit without economizer control, only 4000 cfm of the 5000 cfm needed for cooling requires mechanical cooling, since the 1000 cfm of ventilation air is already cooled. Of the other 5000 cfm, 4000 cfm is return air and is neutral, and 1000 cfm is ventilation air to be heated. In the final analysis, it must be determined if it is more economical to heat 4000 cfm from 55 F to 75 F, or to cool it from 75 F to 55 F. The answer depends on the efficiency of the cooling and heating source.

An example of economizer economics is illustrated in Fig. 17. The graph plots percent cooling load versus relative energy cost (electricity to gas) and is based on the following typical assumptions:

48MA028 – 10,000 cfm, 15% outdoor air
48 F outdoor changeover temperature
75 F room design
55 F supply air temperature
Compressor changeover point (COP.) of 3.3 (100 F condensing temperature and unloaded compressor were used to obtain this value)

The relative cost figures are in $/Btu input for gas and $/kwh electric cost converted to Btu.

Example:

$.10/100,000 Btu (input) – gas cost
$.015/kwh – electric cost

Convert electric cost:

$$\$.015/\text{kwh} \times \text{kwh}/3413\ \text{Btu} \times \frac{100{,}000\ \text{Btu}}{100{,}000\ \text{Btu}}$$

$$= \$.44/100{,}000\ \text{Btu}$$

Cost Ratio:

$$\frac{\$.44/100{,}000\ \text{Btu}}{.10/100{,}000\ \text{Btu}} = 4\,4$$

Therefore, if cooling load is less than 45% (from graph) at the changeover temperature, the economizer is uneconomical for 48MA units.

For 50ME electric heat units, the cooling load break-even point is 70%; the internal load must be greater than 70% to justify economizer control.

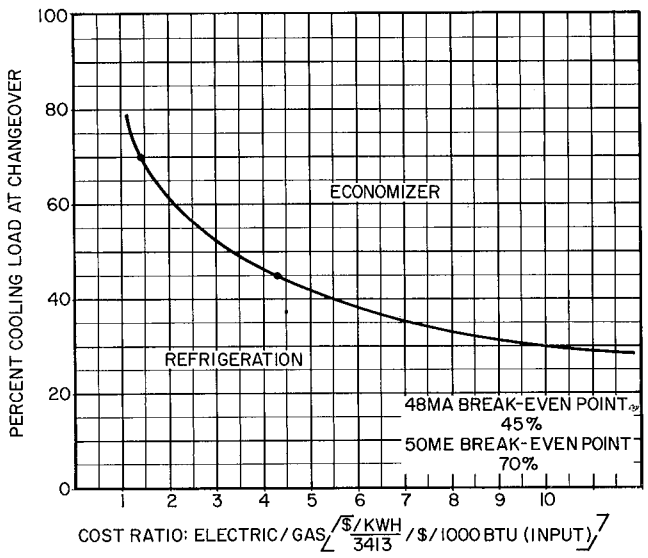
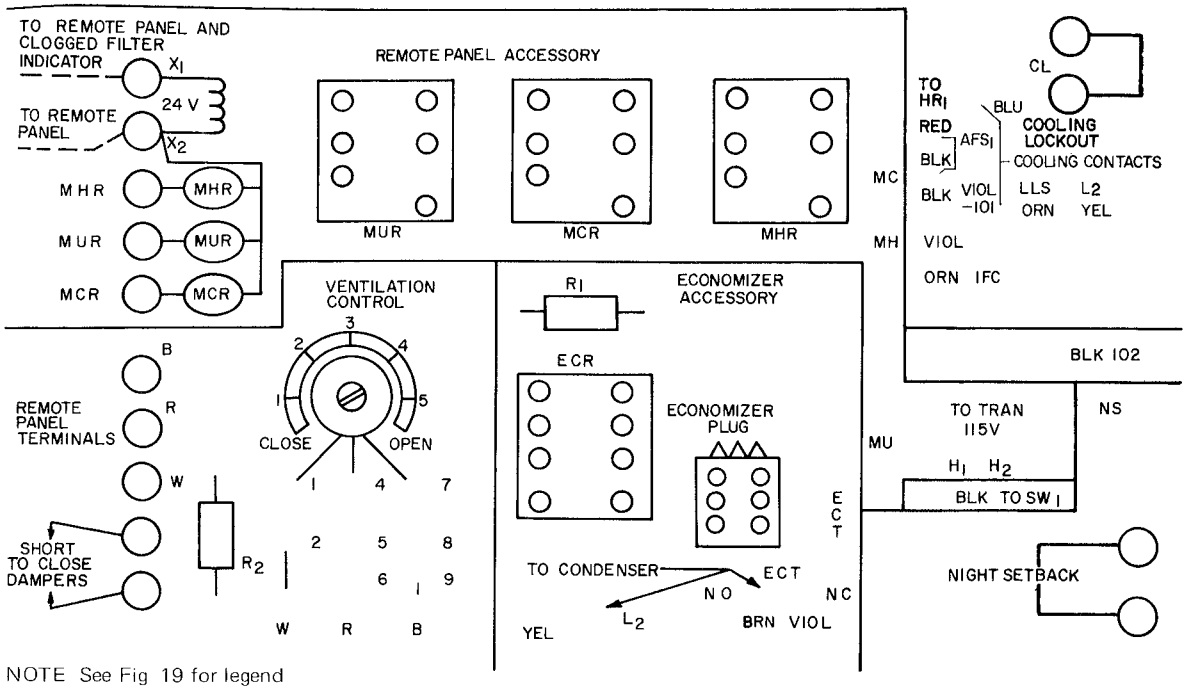


Fig. 17 – 48MA/50ME Economizer Break-Even Point



NOTE See Fig 19 for legend

Fig. 18 – Zone Control Board Component Location

The cooling load for this comparison is the internal load (lights and people) minus the negative transmission at the changeover temperature (48 F). To determine the percent cooling load, compare this value to the unit design cooling capacity.

Night Setback – Night setback control can be added to a 48MA/50ME unit using field-supplied components. There are 3 sets of terminals on the accessory section of the unit zone control board (see Fig. 18). The terminals are used in combination to achieve the system desired. Terminal sets are: cooling lockout (CL), night setback (NS) and "Short To Close Dampers." Red jumpers are factory wired across CL and NS; "Short To Close Dampers" are bare (see Fig. 19). If the circuit between CL terminals is broken, 115-v power to the compressor control circuit liquid line solenoids and economizer thermostat (if used) is shut off. If the circuit between NS terminals is broken, 115-v power to the zone control transformers is shut off. By replacing both jumpers with appropriate switches and connecting proper switch across "Short To Close Dampers," NS control is attained. Although many versions of NS are possible, the 3 most common methods are detailed here.

METHOD NO. 1 – HEATING NIGHT SETBACK, COOLING LOCKED OUT, AND CONTINUOUS INDOOR FAN OPERATION

This automatic NS system requires a Honeywell S659A seven-day timer, a Honeywell R8227B fan center (night setback relay) and a Honeywell T822D thermostat (heating type) 24-v service. In this system (see Fig. 20), when the timer reaches the "Night" position, the switches are as shown. CL opens, dampers close and NS opens. The fan continues to operate.

As the temperature falls, the NS thermostat located in the average temperature space energizes the NS relay (fan center) which in turn energizes the zone control transformers. The individual zones then heat until the NS thermostat is satisfied. The dampers remain closed and cooling is still locked out. If a day/night switch is used, the NS thermostat is overridden and heating is controlled by the normal thermostats.

Accessory remote panel assembly and/or accessory economizer may be used with this system if desired. Cycling indoor fans with NS thermostat is possible if the accessory remote panel is not used. Connect the field wiring to the MU terminals instead of the NS and the indoor fan contactor will cycle with the heaters. Although this system does not provide a time off delay for the fans after heater shutdown, test experience indicates that this is not a problem on these units.

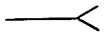
METHOD NO. 2 – HEATING NIGHT SETBACK, COOLING LOCKED OUT AND CYCLING INDOOR FANS

This system requires a Carrier remote control panel assembly 48MA900041, Honeywell S659A seven-day timer, Honeywell R8227B fan center (night setback relay) and a Honeywell T822C thermostat (cooling type).

The number of candidate systems for NS increases with the use of the remote accessory panel. A typical system is shown in Fig. 21. The use of the master unit relay (MUR) and the master cooling relay (MCR) requires 24-v wiring only. Installing the timer and the NS relay in proximity to the remote control panel results in all wiring being located inside the building in one area.

LEGEND

AB – Accessory Board
AFS – Airflow Switch
APS – Air Pressure Switch
C – Compressor Contactor
Cap. – Capacitor
CB – Circuit Breaker
CCB – Compressor Circuit Breaker
CCP – Capacity Control Pressurestat
CH – Crankcase Heater
CHR – Crankcase Heater Relay
CL – Switch, Cooling Lockout
CO – Convenience Outlet
Compr – Compressor
CR – Cooling Relay
DLT – Discharge Line Thermostat
ECR – Economizer Relay
ECT – Economizer Thermostat
EXR – Exhaust Relay
FCB – Fan Circuit Breaker
FCPS – Fan Cycling Pressurestat
FL – Fusible Link
FRS – Filter Media Runout Switch
Fu – Fuse
GV – Gas Valve
Gnd – Ground
HA – Heat Anticipator
HC – Heater Contactor
HPS – High Pressure Switch
HR – Holding Relay
Htr – Heater
I – Ignitor
IFC – Indoor Fan Contactor
IFCB – Indoor Fan Circuit Breaker
IFM – Indoor Fan Motor
IP – Internal Protector
LAT – Low Ambient Thermostat
LLS – Liquid Line Solenoid
LPS – Low-Pressure Switch
LS – Limit Switch
MCR (MC) – Master Cooling Relay
MHR (MH) – Master Heating Relay
MUR (MU) – Master Unit Relay
N.C. – Normally Closed
N.O. – Normally Open
NS – Night Setback Switch
OAT. – Outdoor Air Thermostat
OFC – Outdoor Fan Contactor
OFCB – Outdoor Fan Circuit Breaker
OFM – Outdoor Fan Motor
Plg – Plug
R – Resistor
RB – Relay Board
Sw – Switch
TB – Terminal Block
TC – Thermostat, Cooling
TH – Thermostat, Heating
TM – Timer Motor
Tran – Transformer
ZB – Zone Board


Receptacle

Plug

Terminal Block

Terminal (marked)

Terminal (unmarked)

Circuit Board Terminal

Splice

Terminal, Circuit Board, Factory Connected

Terminal, Circuit Board, Field or Accessory

Factory Wiring

Accessory or Field Wiring

Circuit Board Run

To indicate common potential only, not to indicate wire.

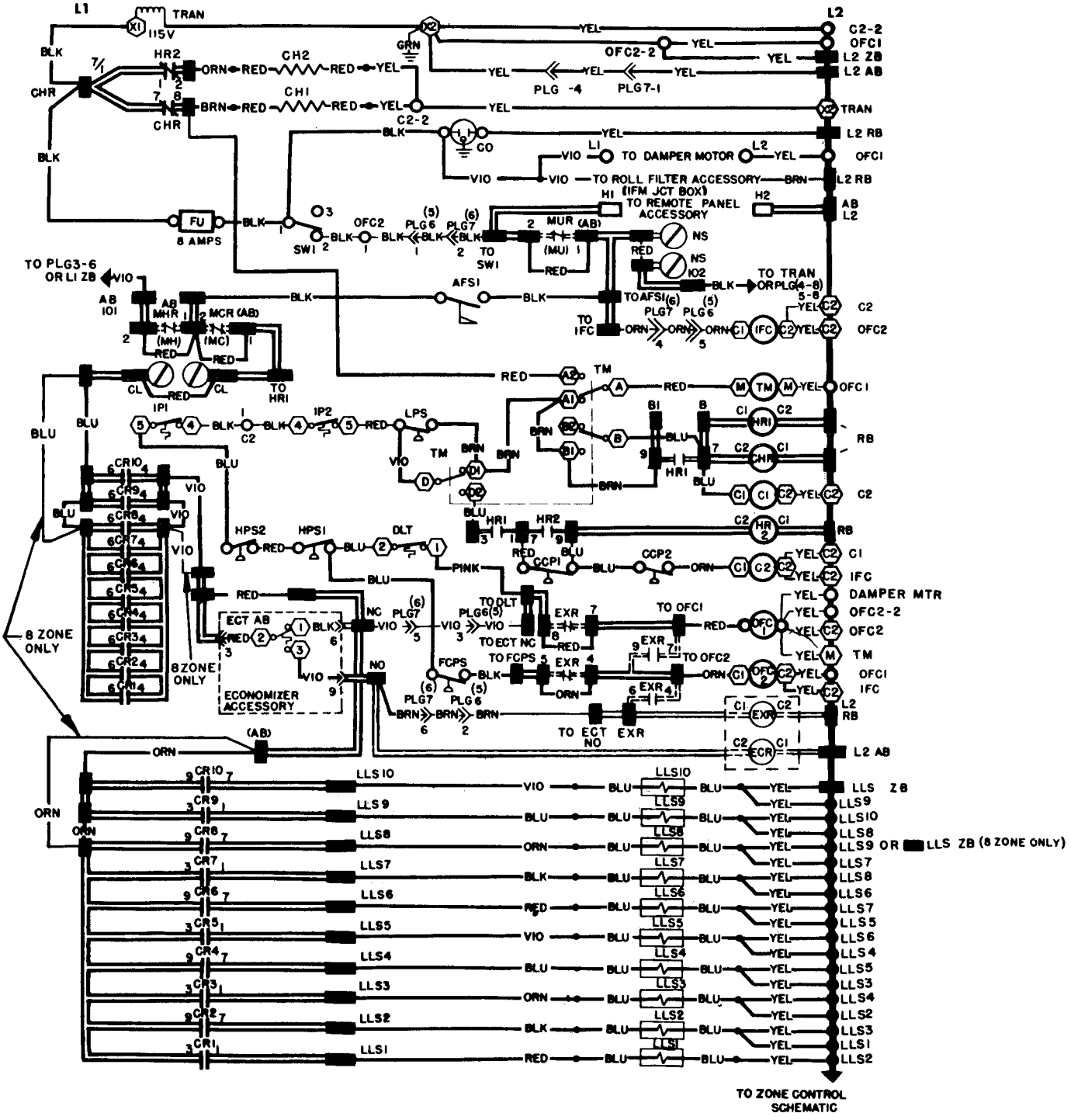


Fig. 19 – Unit As Shipped From The Factory

In this system, the MUR is energized by the NS controls. This opens a set of normally closed contacts and shuts down the unit, including indoor fans. The outdoor air dampers are also closed by the MUR. Cooling lockout is attained by energizing the MCR. Energizing these relays turns the unit off and the NS system seems to work in reverse.

A cooling thermostat is used on heating NS. When temperature rises, the thermostat, in series with the night switch, energizes the NS relay. Its contacts close and, in series with the time clock contacts, energize the MUR. As the space temperature lowers to the NS setting, the NS thermostat de-energizes the NS relay which de-energizes the MUR, turning on the unit.

Again the day/night switch overrides the NS clock and heating can occur because the NS relay is de-energized. The factory jumpers remain across CL and NS terminals.

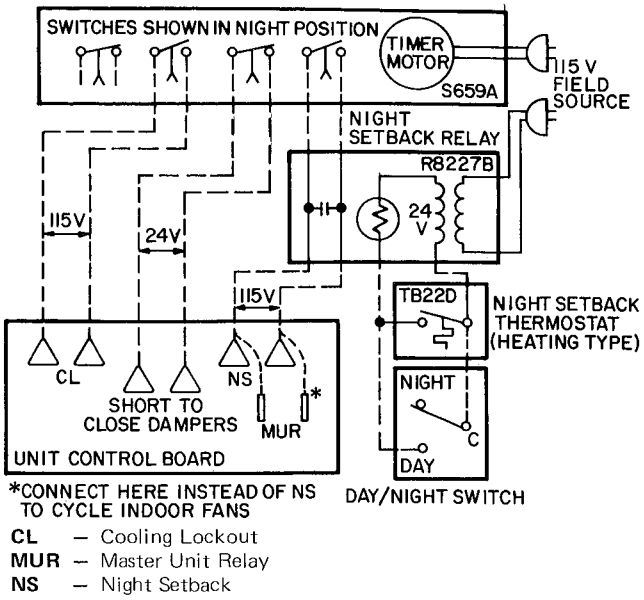


Fig. 20 – Night Setback, Method #1

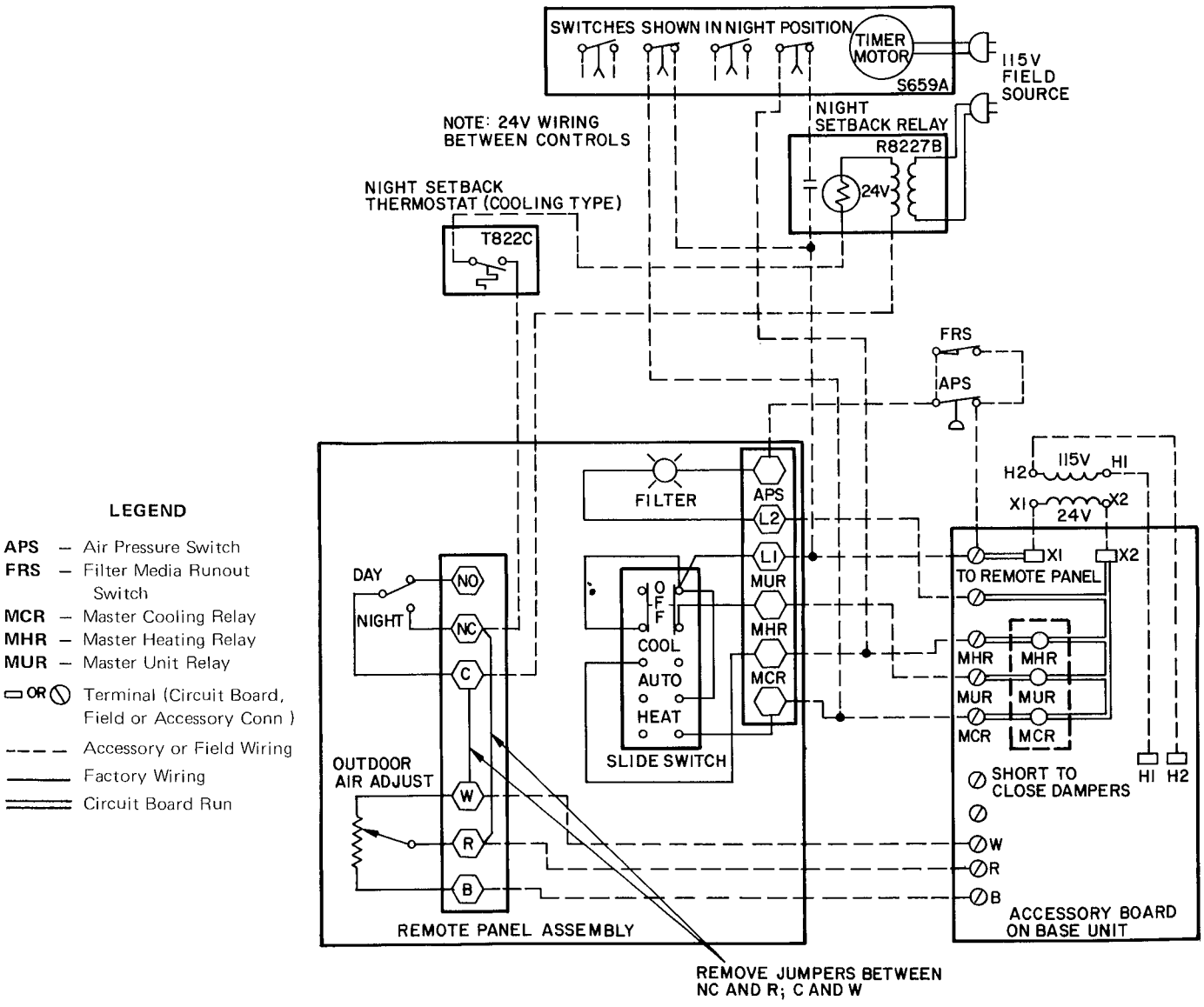


Fig. 21 – Night Setback, Method #2

This system opens the dampers when the indoor fans start. To keep them closed, short across the W-R terminals on the remote control panel or the "Short To Close Dampers" terminals during the NS period.

METHOD NO. 3 – USING ACCESSORY REMOTE PANEL, HEATING AND COOLING NIGHT SETBACK AND INDOOR FAN CYCLING

This system requires a:

Carrier remote control panel assembly 48MA900041

Carrier heating and cooling thermostat HH07AT074

Carrier subbase HH93AZ070

Night setback relay (Honeywell fan center R8227A)

Seven-day timer (Honeywell S659A)

The system (Fig. 22) is a proposed heating and cooling night setback with fan cycling. The thermostat is a standard Carrier part with no switches on the subbase. This requires a NS relay with normally closed contacts so an alternate, Honeywell R8227A is required.

Because cooling is not locked out, the clock switches that close at night are used to directly close the outdoor air dampers by connecting across R and W on the remote panel accessory. Again the MUR shuts down the unit (including the indoor fans). When the NS thermostats reach their settings, the NS relay is energized, opening the NC contacts and de-energizing the MUR.

However, if a "wild" zone exists, it is allowed to cool on heating NS or vice versa. This may be an advantage on some applications between zones.

Again when the day/night is switched to "Day," the NS is overridden and the unit operates normally except the dampers remain closed at night.

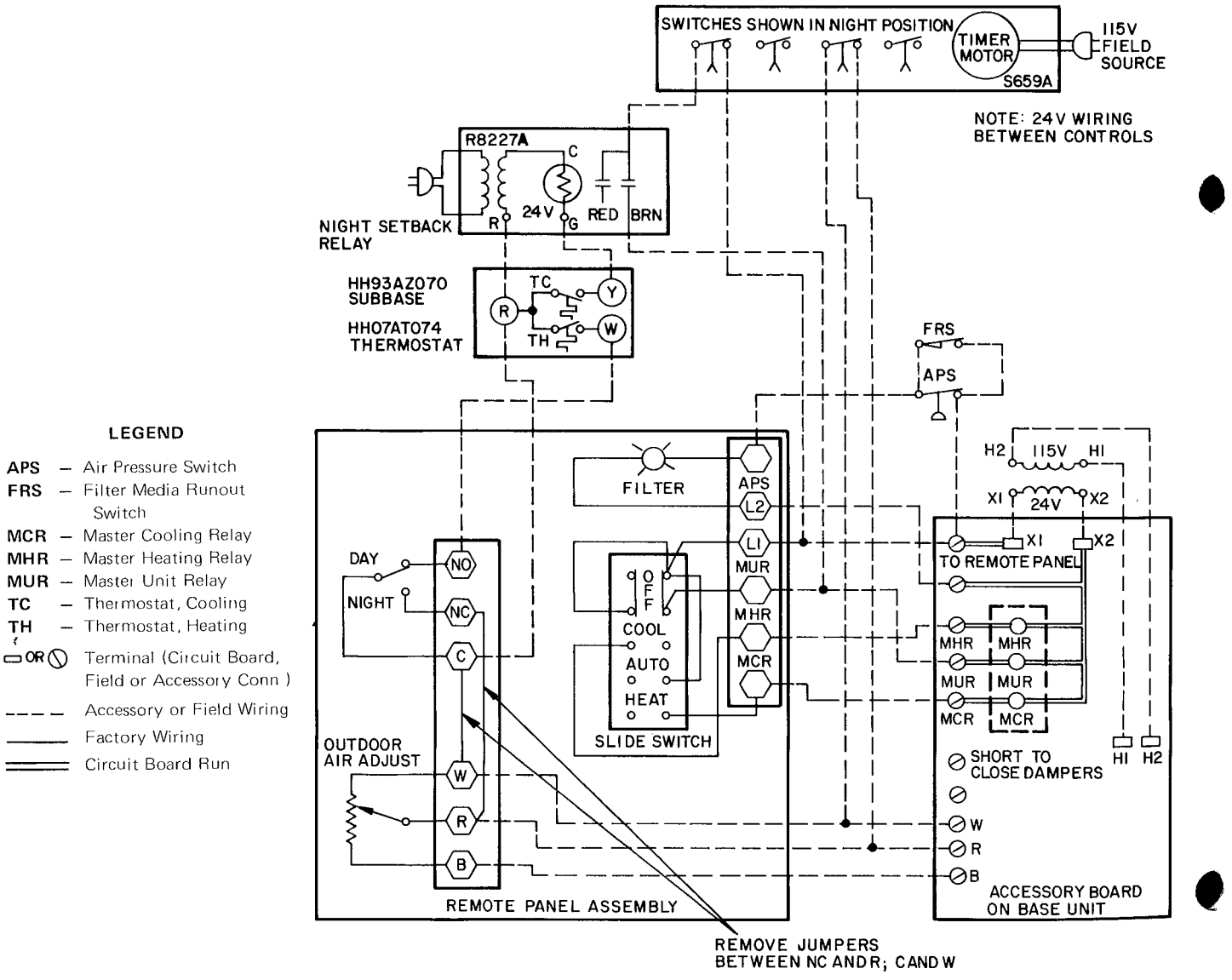


Fig. 22 – Night Setback, Method #3

Again, 2 jumper wires have to be removed from the back of the remote panel to isolate the day/night switch.

MORNING START-UP – To conserve energy and lower total operating costs, the outdoor dampers may be closed when starting the system in the morning. During a warm-up period, when the system is operated for one or two hours before occupancy, only building return air should be heated. The extra load of cold outdoor air introduced uses extra heat energy. Ventilation is unnecessary until space is occupied, so the air introduced produces unnecessary heat waste.

The same principle holds true on a cooling day, when outside air transmits heat and moisture to the evaporator coil. This extra load above the return air only load is an unnecessary expense.

This can be offset by wiring a heating or cooling thermostat across the "Short To Close Dampers" terminals on the zone control board. The thermostat senses return air temperature and the outdoor air damper does not open until the building is at the required temperature.

A time clock can also be used and set as follows:

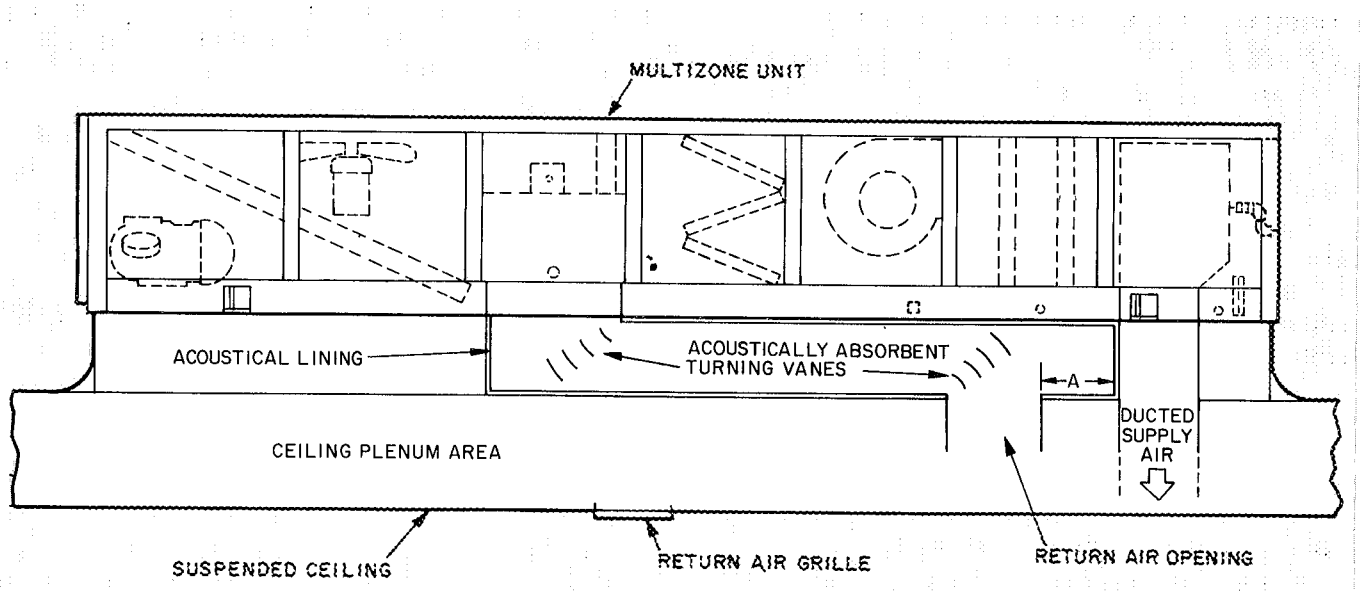
1. Occupied cycle: 8 a.m. to 6 p.m. Outdoor air damper is open and the system is controlled by individual zone thermostats.
2. Night setback cycle: 6 p.m. to 6 a.m. Individual zone thermostats are on night setback (NS) cycle. The outdoor air damper is closed, the unit is reset down and controlled by NS thermostat.
3. Warm-up (or cool-down) cycle: 6 a.m. to 8 a.m. Outside air damper is closed by time clock and the system is controlled by indoor zone thermostats.

Using any method, increased economy is achieved and building requirements are satisfied.

MISCELLANEOUS

Sound and Vibration – All roof mounted air conditioning equipment produces sound and vibration. On light types of roof construction, sound and vibration may be transmitted directly to the occupied space. Accordingly, sound attenuation and vibration isolation are important design considerations on any rooftop application.

Sound attenuation can be accomplished in many ways depending on the specific design construction of the building. Roof mounted units can be located over unoccupied space (i.e. storage areas, utility rooms, corridors) where slightly higher sound levels are not objectionable. Supply and return duct systems can be acoustically lined to prevent sound transmission into occupied space. If open plenum return air systems are used, an acoustical trap or fiberglass-lined chamber can be used to attenuate the sound. Simple return duct elbows and tees with 5-ft minimum fiberglass lined legs and low static pressure drop should be considered when using open plenum return air systems. Figure 23 illustrates a procedure for forming an acoustical trap using the roof curb area under a 48MA unit.



NOTES:

1 Dimension A is approximately 7 in for optimum performance
2 Acoustical lining is 1-in 1-lb density, neoprene-coated fiberglass
3 Return air grille should be located at least 15 ft from return air opening

Fig. 23 – Acoustical Trap Installation

Roof mounted air conditioning equipment usually has adequate vibration isolation of internal components. However, light roof construction or equipment location displaced from main roof supports may dictate additional isolation to eliminate vibration.

Special vibration isolating bases and curbs designed for rooftop applications are available from some vibration isolator manufacturers. This equipment virtually eliminates vibration transmission on critical applications. However, care should be exercised when selecting this equipment for use with a multizone. The design and installation of vibration rails on a Carrier 48MA/50ME should ensure that the interfacing of the vibration isolator and the curb maintain watertight integrity.

Thermostat Usage and Control

USAGE – The thermostats used with the 48MA/50ME units are either a 2-step heat/1-step cool or 2-step heat/2-step cool. A single module can have only one step of cooling, but can have 2 steps of heating. When 2 or more modules are grouped together, the 2-step heat/2-step cool thermostat can be used. Modules are grouped together by the installation of factory-supplied jumpers on the unit zone control board.

The thermostats are automatic changeover with a 3 F dead spot between heating and cooling. There is a 1°F differential between the first and second steps of heating or cooling. Two subbases are available for use with the thermostats; one with off-heat-auto.-cool switch and one without switches for tamper-proof installation. The tamper-proof subbase has provisions for locking the thermostat cover and temperature selectors.

CONTROL – The thermostat field wiring connections are made at the screw-type terminals on the printed circuit board near the heating end of the unit. This is commonly called the zone control board. (See Fig. 24.)

Each module has the following thermostat terminals: R (24-v power supply), Y (for cooling), W1 (first step heating) and W2 (second step heating). Pairs of modules are combined to form nests: 1 and 2; 3 and 4; 5 and 6; etc. Each nest forms National Electrical Code (NEC) Class II circuit powered by its own 40 va transformer. Each transformer is basically limited in capacity to operate only the relays within its nest. Therefore, contacts are provided in the relays to transfer the signal to another module in an adjacent nest.

By correctly installing jumpers on zone control board terminals, the contacts from a relay in one nest power a relay in the adjacent nest using the transformer of the adjacent nest. This technique is known as multiplexing.

Same Nest Ganging – Figure 25 shows 2 modules (1 and 2) of the same nest ganged together to form a 2-module zone. Field jumpers are installed on same lettered terminals to energize both control relays simultaneously for cooling or first- and second-stage heating relays or gas valves for heating.

Figure 26 is similar to Fig. 25 except a 2-step cooling thermostat independently powers the Y connections for 2-step cooling in one zone. These 2 examples have not left the particular nest, so no multiplexing has been done.

Adjacent Nest Ganging – Figure 27 shows 2 modules (2 and 3) of adjacent nests ganged together in one zone so multiplexing is in effect. Module 1 is in a zone of its own. When CR2 is energized by the cooling thermostat, terminal 6 is powered thru CR2 contacts 1 and 3 by the transformer of the second nest. Then terminal 6 is jumpered to 1 and CR3 is energized. Thus, on a call for cooling, modules 2 and 3 are energized simultaneously. The same principles and procedures are followed for the first and second steps of heating.

Multiple Ganging – Figures 28 thru 31 are further examples of ganging and multiplexing zones to provide 2, 3 or 4 modules per zone. These typical examples demonstrate the principles of multiplexing. The same procedures are followed for the remainder of the zones on the unit. Many more combinations are possible. Do not overload a transformer by powering more than one relay of a different nest in additon to the relays in its own nest.

Multiplexing is done from top to bottom of the zone control board . . . from module 2 to 3 and 4, from 4 to 5 and 6, and from 6 to 7 and 8. The contacts of one module are powered by the nest of the next higher numbered module (see Fig. 24).

Return Air Systems

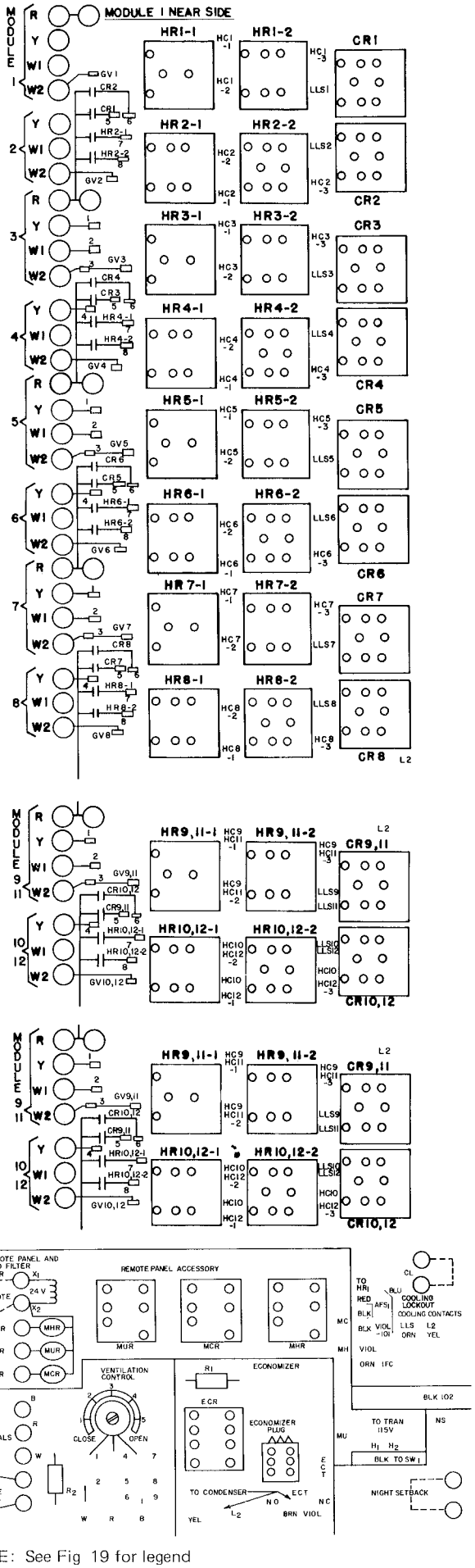
If the ceiling plenum on a top floor is used as a return air plenum, the return air is heated from the time it leaves the room and enters the unit. This is due to roof load or if heat from lighting is added to the plenum.

When considering the top floor, the roof load does not raise the return air temperature significantly and, therefore, its effect is considered negligible when selecting a unit.

Return air light troffers, however, can add considerable heat to the return air. Using a 48MA/50ME unit with a return air light troffer system can impose various design problems since the purpose of the system is to reduce the supply cfm to the space by reducing the space load. With the 48MA/50ME this may result in a very low

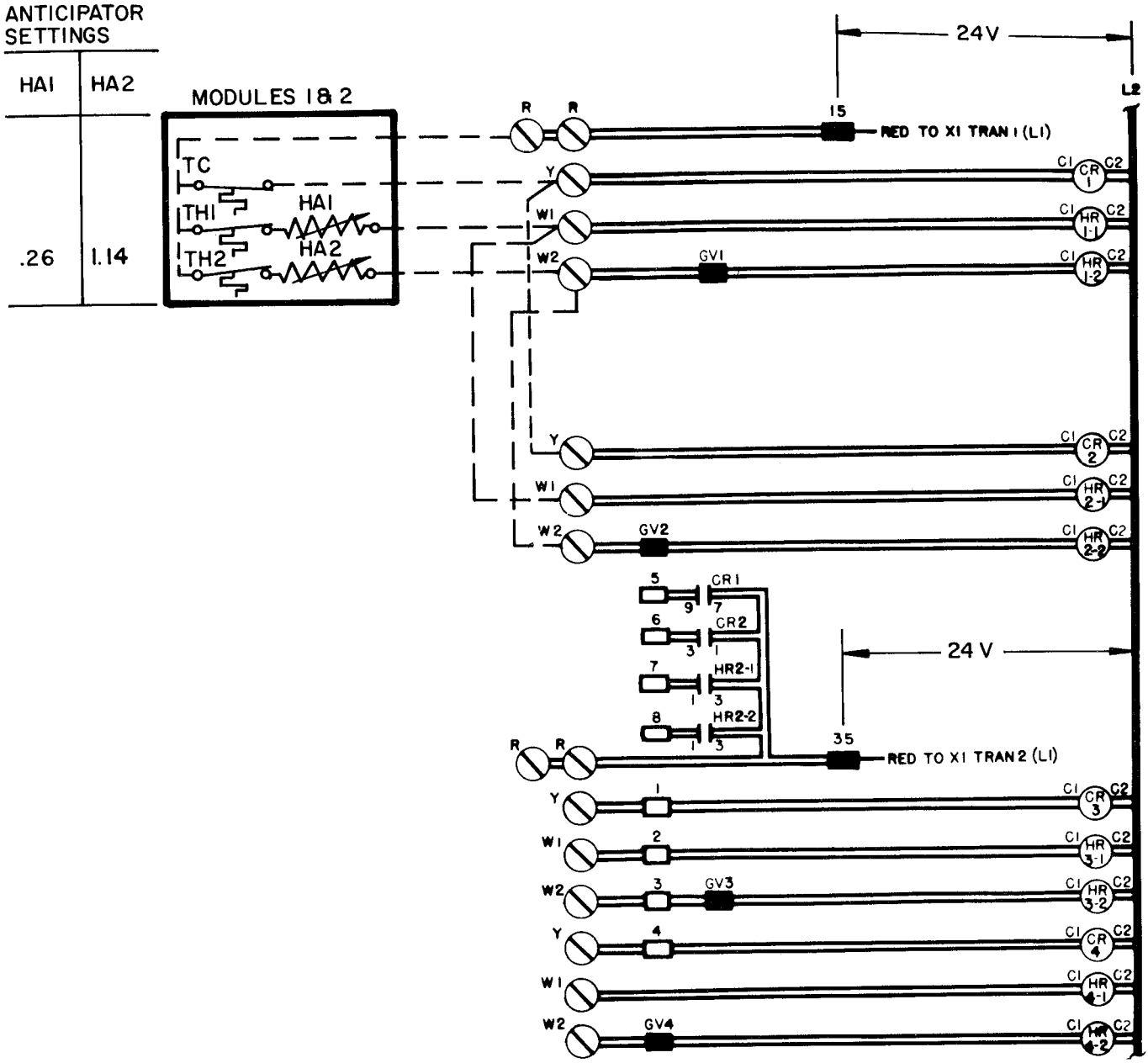
supply cfm – much lower than the unit was designed for. If the supply cfm is raised to satisfy the unit, the purpose of the return air light troffers is defeated. As a general rule, a return air temperature rise of 5 to 10 F does not cause a problem, and special ratings can be made available.

In addition, when the supply cfm is reduced, as above, the outdoor air quantity remains constant. This results in a higher than normal percentage of outdoor air which the 48MA/50ME unit may not be capable of introducing. For return air light troffer systems, exercise care when using the light manufacturers' data concerning the amount of heat actually returned to the unit because with the higher return air temperature, a portion of the heat is transmitted back to the space thru the ceiling.



NOTE: See Fig 19 for legend

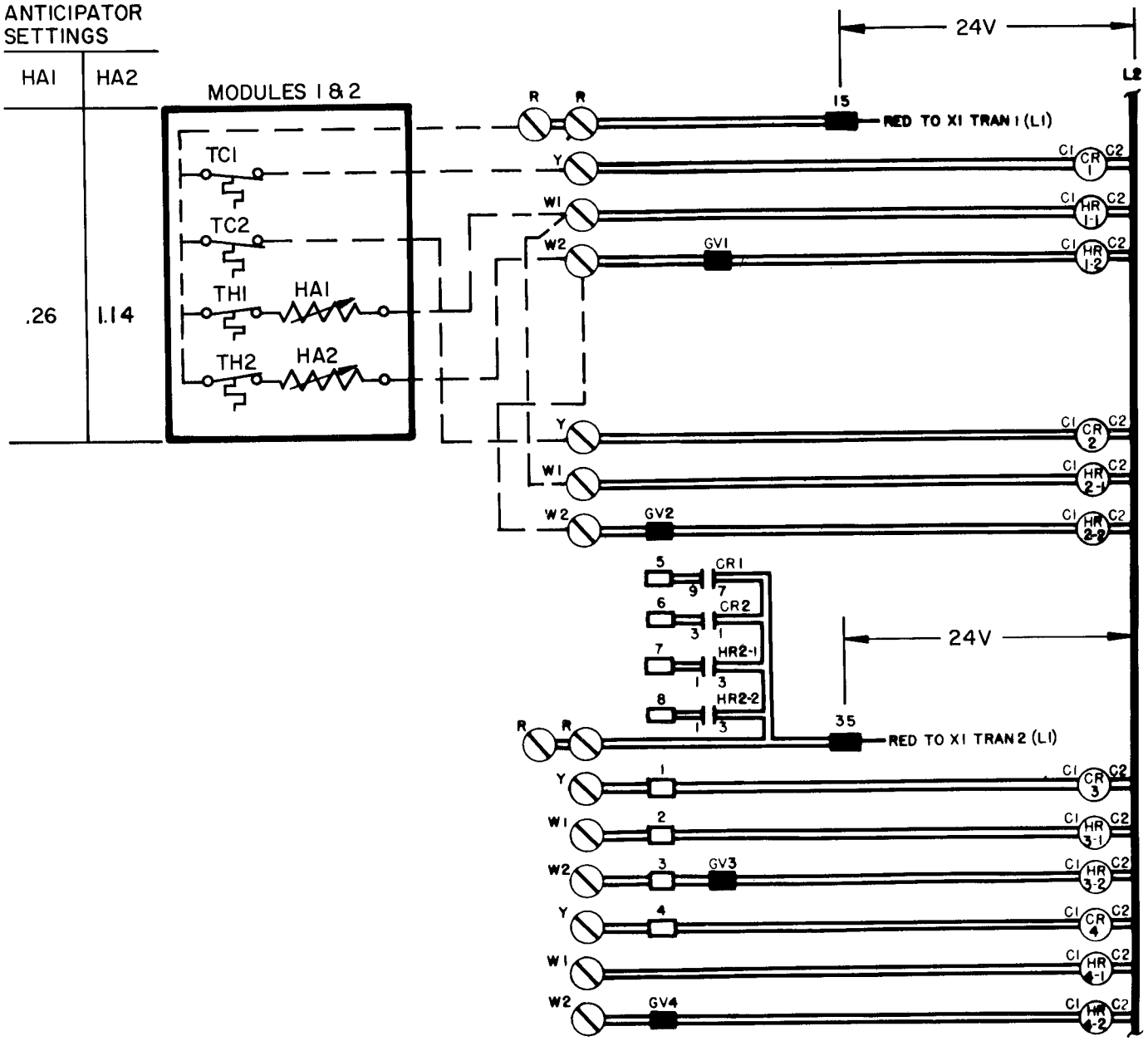
Fig. 24 — Zone Control Board



LEGEND

CR	– Control Relay
GV	– Gas Valve
HA	– Heat Anticipator
HR	– Heating Relay
TC	– Thermostat, Cooling
TH	– Thermostat, Heating
Tran	– Transformer
⊘	Screw Terminal
▭	Quick-Connect Terminal
———	Factory Control Wires
═══	Printed Circuit
– – – –	Field Wiring

Fig. 25 — Two-Stage Heat, One-State Cool — Same Nest



LEGEND

CR	–	Control Relay
GV	–	Gas Valve
HA	–	Heat Anticipator
HR	–	Heating Relay
TC	–	Thermostat, Cooling
TH	–	Thermostat, Heating
Tran	–	Transformer

⊘ Screw Terminal

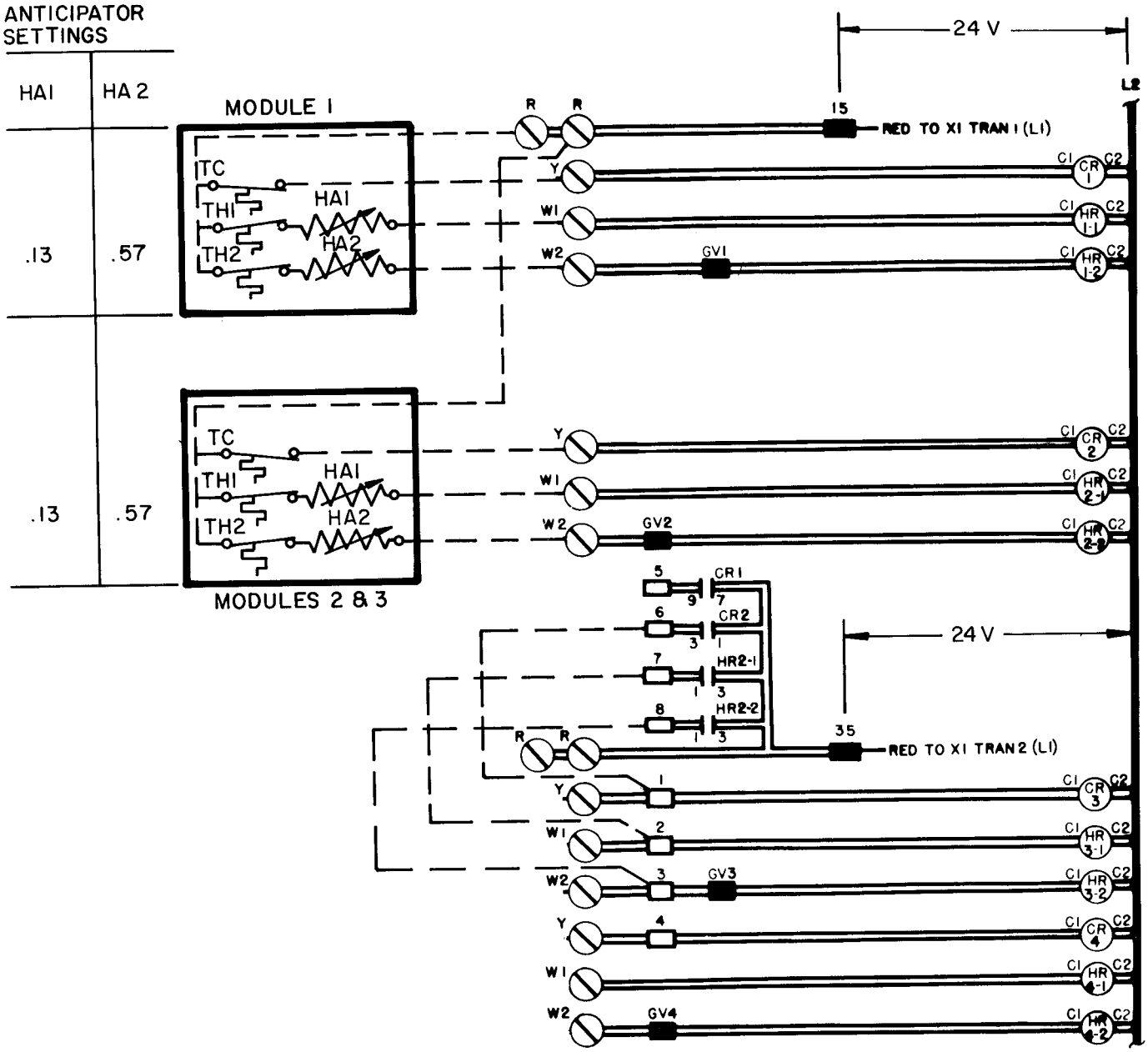
▭ Quick-Connect Terminal

——— Factory Control Wires

═══ Printed Circuit

– – – – Field Wiring

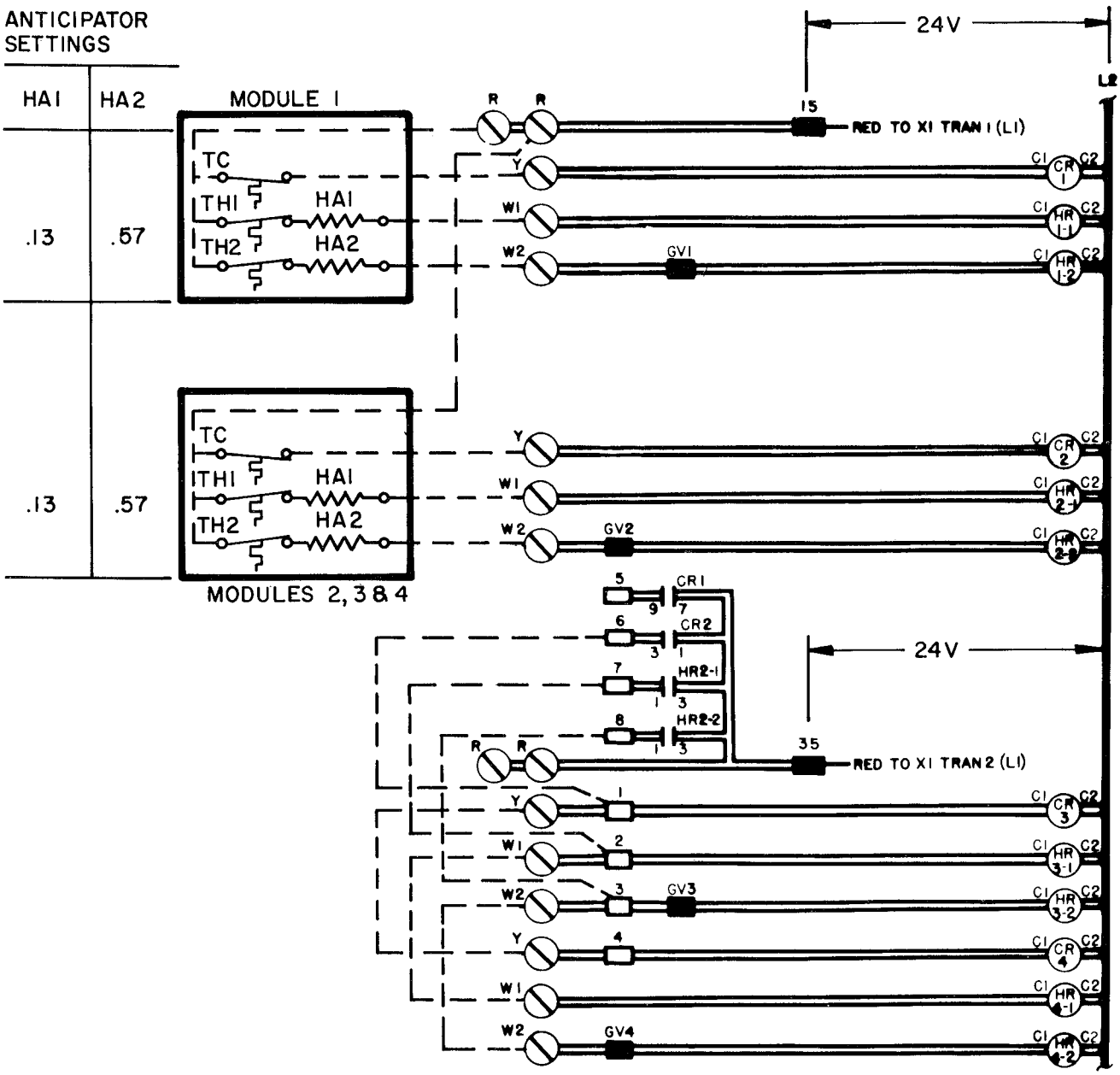
Fig. 26 – Two-Stage Heat, Two-Stage Cool – Same Nest



LEGEND

CR	– Control Relay
GV	– Gas Valve
HA	– Heat Anticipator
HR	– Heating Relay
TC	– Thermostat, Cooling
TH	– Thermostat, Heating
Tran	– Transformer
⊘	Screw Terminal
▭	Quick-Connect Terminal
———	Factory Control Wires
═══	Printed Circuit
– – – –	Field Wiring

Fig. 27 – Two-Stage Heat, One-Stage Cool – Adjacent Nest



LEGEND

CR	–	Control Relay
GV	–	Gas Valve
HA	–	Heat Anticipator
HR	–	Heating Relay
TC	–	Thermostat, Cooling
TH	–	Thermostat, Heating
Tran	–	Transformer

⊘ Screw Terminal

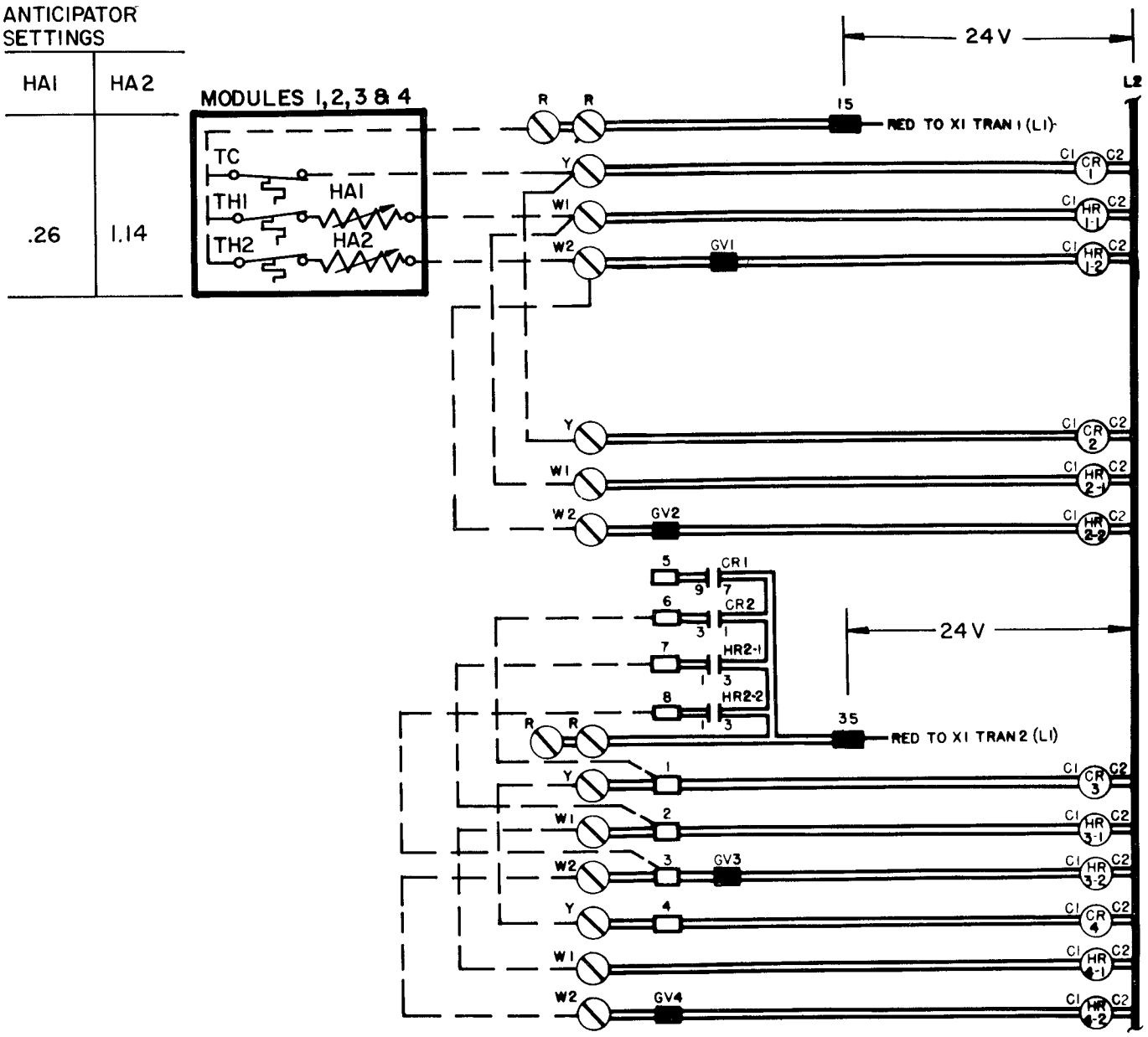
▭ Quick-Connect Terminal

——— Factory Control Wires

═══ Printed Circuit

– – – – Field Wiring

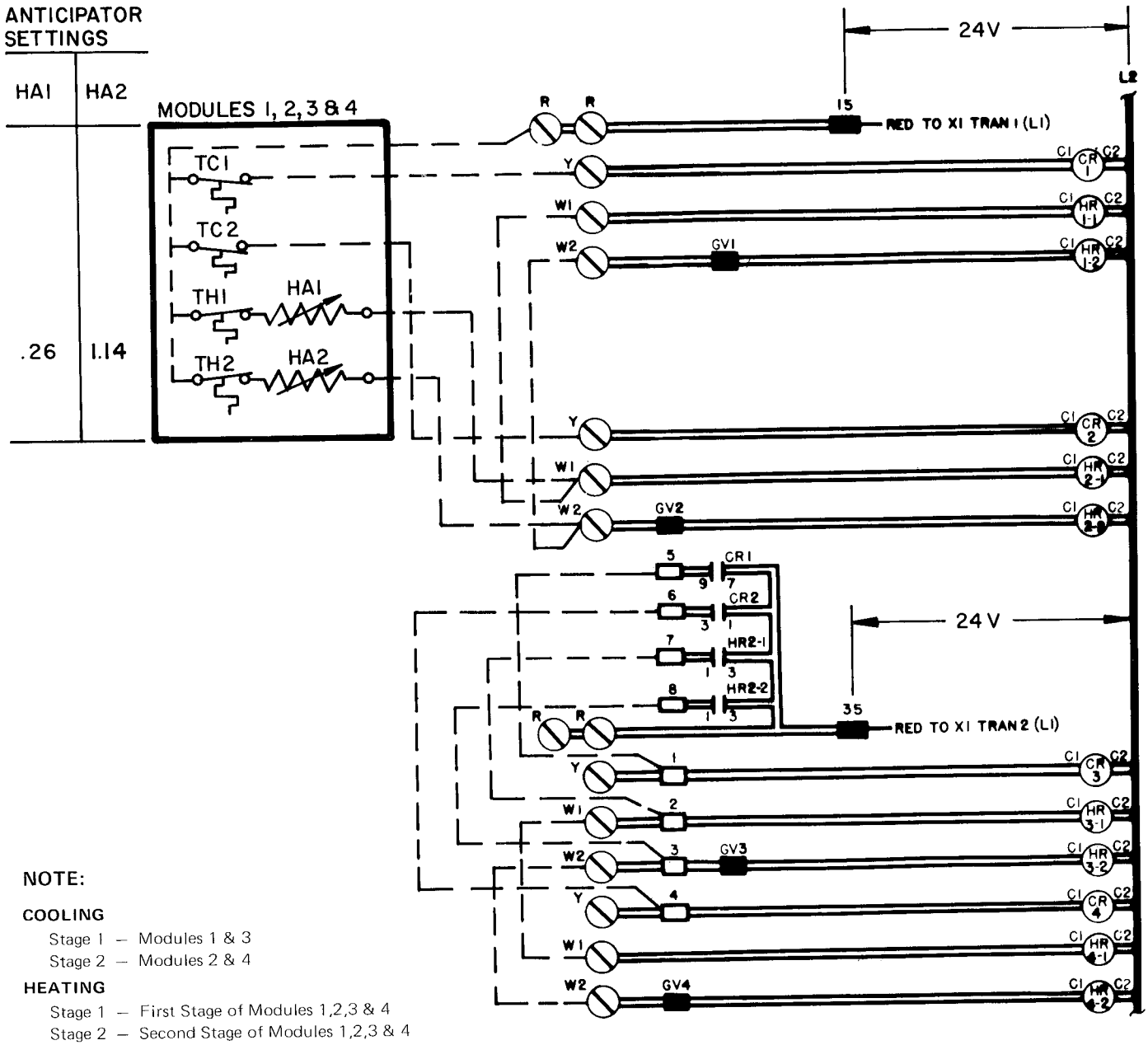
Fig. 28 – Two-Stage Heat, One-Stage Cool – 3 Modules Per Zone



LEGEND

CR	–	Control Relay
GV	–	Gas Valve
HA	–	Heat Anticipator
HR	–	Heating Relay
TC	–	Thermostat, Cooling
TH	–	Thermostat, Heating
Tran	–	Transformer
⊘		Screw Terminal
▭		Quick-Connect Terminal
———		Factory Control Wires
═══		Printed Circuit
– – – –		Field Wiring

Fig. 29 — Two-Stage Heat, One-Stage Cool — 4 Modules Per Zone



NOTE:

COOLING

Stage 1 – Modules 1 & 3
Stage 2 – Modules 2 & 4

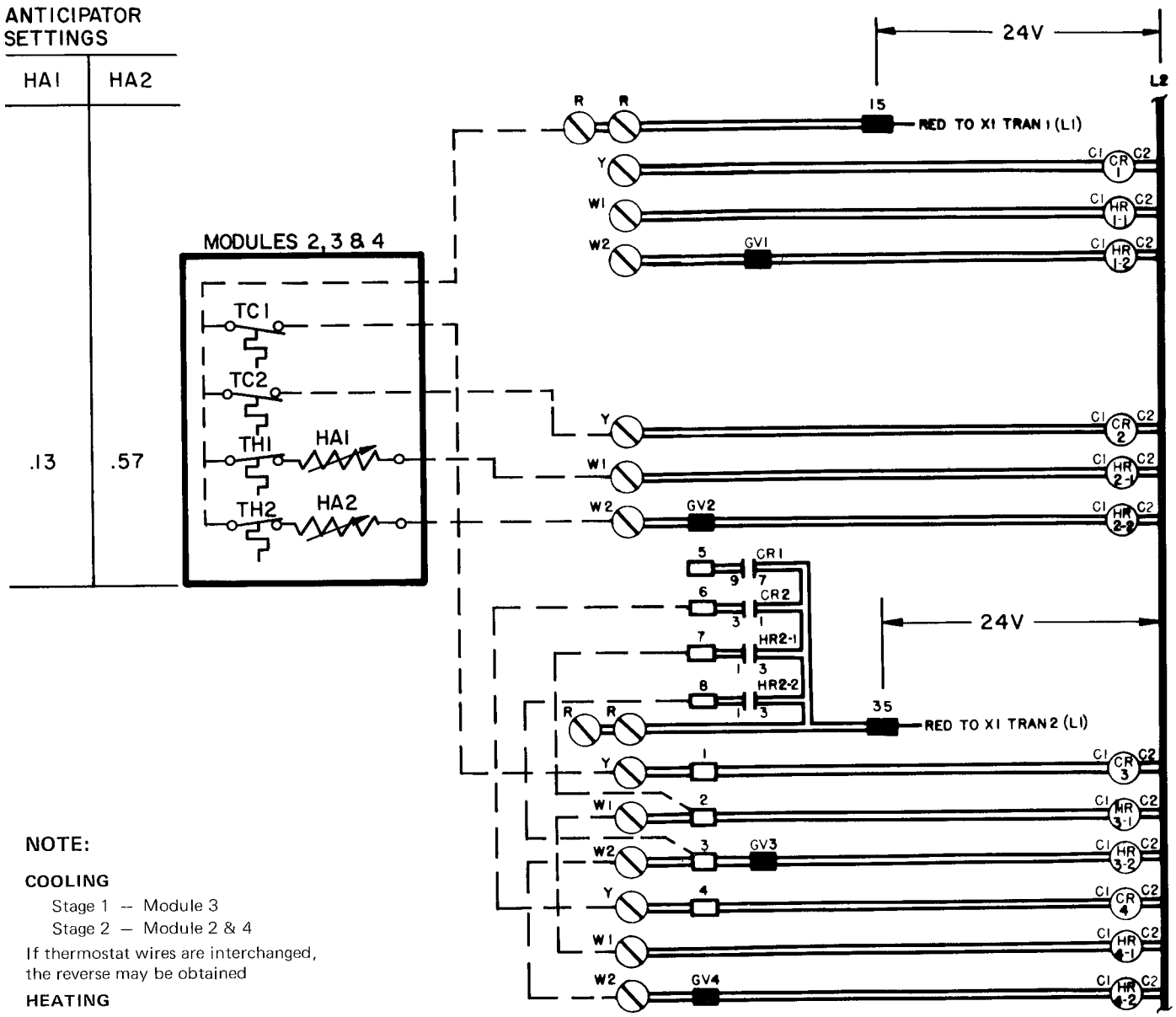
HEATING

Stage 1 – First Stage of Modules 1,2,3 & 4
Stage 2 – Second Stage of Modules 1,2,3 & 4

LEGEND

CR – Control Relay
GV – Gas Valve
HA – Heat Anticipator
HR – Heating Relay
TC – Thermostat, Cooling
TH – Thermostat, Heating
Tran – Transformer
⊘ Screw Terminal
▭ Quick-Connect Terminal
——— Factory Control Wires
═══ Printed Circuit
– – – – Field Wiring

Fig. 30 – Two-Stage Heat, Two-Stage Cool – 4 Modules Per Zone



NOTE:

COOLING

Stage 1 -- Module 3
Stage 2 — Module 2 & 4

If thermostat wires are interchanged, the reverse may be obtained

HEATING

Stage 1 — First Stage of Modules 2,3 & 4
Stage 2 — Second Stage of Modules 2,3 & 4

LEGEND

CR — Control Relay
GV — Gas Valve
HA — Heat Anticipator
HR — Heating Relay
TC — Thermostat, Cooling
TH — Thermostat, Heating
Tran — Transformer

⊘ Screw Terminal
▭ Quick-Connect Terminal
——— Factory Control Wires
═══ Printed Circuit
– – – – Field Wiring

Fig. 31 — Two-Stage Heat, Two-Stage Cool — 3 Modules Per Zone

PERFORMANCE DATA

Room Design 75 F/50% Rh

COOLING CAPACITIES

48MA/50ME016

OUTDOOR AIR TEMP		TOTAL UNIT CFM																					
		4,000 Outdoor Air Cfm									5,000 Outdoor Air Cfm								6,000 Outdoor Air Cfm				
		0			750			1500			0			750			1500			0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	168	118	14 8	174	126	15 1	177	134	15 2	176	130	15 2	181	139	15 4	184	146	15 6	181	142	15 4	186	150	15 7	188	158	15 8
	70	168	118	14 8	178	122	15.3	184	124	15 6	176	130	15.2	184	134	15.6	190	137	15.9	181	142	15.4	189	146	15.8	194	149	16.1
90	65	164	116	15 4	169	129	15 7	172	140	15.8	171	128	15 8	176	141	16 0	179	152	16 2	176	140	16 0	181	152	16 3	183	164	16 4
	70	164	116	15 4	173	124	15 9	179	131	16 2	171	128	15 8	179	136	16 2	185	143	16 4	176	140	16 0	184	148	16 4	189	155	16 6
	73	164	116	15 4	176	121	16 0	183	125	16 4	171	128	15 8	182	133	16 3	188	137	16 6	176	140	16 0	186	145	16 5	192	149	16 8
	75	164	116	15 4	177	119	16 1	186	121	16 5	171	128	15 8	183	131	16 4	191	133	16 8	176	140	16 0	187	143	16 6	194	145	16 9
95	65	160	114	16 0	165	131	16 2	168	146	16 4	167	126	16 3	172	143	16 6	174	158	16 7	172	138	16 6	176	155	16.8	178	170	17 0
	70	160	114	16 0	169	126	16 4	174	137	16 7	167	126	16 3	175	138	16 8	180	149	17 0	172	138	16 6	179	150	17 0	183	161	17 2
	75	160	114	16 0	173	121	16 6	182	127	17 1	167	126	16 3	178	133	16 9	186	139	17 4	172	138	16 6	182	145	17 1	189	151	17 5
	78	160	114	16 0	175	118	16 8	186	121	17 4	167	126	16 3	180	130	17 1	190	133	17 6	172	138	16 6	184	142	17 2	–	–	–
	80	160	114	16 0	177	116	16 9	189	116	17 5	167	126	16 3	182	128	17.2	–	–	–	172	138	16 6	185	140	17 3	–	–	–
100	70	156	112	16 5	164	128	17 0	170	143	17 3	163	124	16 9	170	141	17 3	175	155	17 6	167	136	17 2	174	152	17 5	178	167	17 8
	75	156	112	16 5	168	123	17 2	177	133	17 7	163	124	16 9	173	136	17 5	181	146	17 9	167	136	17 2	177	147	17 7	–	–	–
	78	156	112	16 5	171	120	17 4	181	127	18 0	163	124	16 9	175	132	17 6	–	–	–	167	136	17 2	179	144	17 8	–	–	–
105	70	152	110	17 0	160	130	17 5	165	149	17 9	158	123	17 4	165	143	17 9	170	162	18 2	162	134	17 7	169	154	18 1	173	173	18 4
	75	152	110	17 0	164	125	17 8	172	139	18 3	158	123	17 4	168	138	18 1	175	152	18 5	162	134	17 7	172	149	18 3	–	–	–
110	78	148	109	17 5	161	124	18 5	171	139	19	154	121	17 9	166	137	18 7	–	–	–	158	132	18 2	169	148	18 9	–	–	–
115	75	144	107	18 0	155	130	18 8	162	152	19 4	149	119	18 4	159	142	19 1	–	–	–	153	130	18 7	162	153	19 3	–	–	–

48MA/50ME024

OUTDOOR AIR TEMP		TOTAL UNIT CFM																					
		5,000 Outdoor Air Cfm									6,500 Outdoor Air Cfm								8,000 Outdoor Air Cfm				
		0			750			1500			0			750			1500			0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	204	143	18 0	212	153	18 5	216	161	18 7	215	161	18 6	222	171	19 0	226	179	19 2	222	178	19 0	229	188	19 4	233	196	19 6
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90	65	200	141	18 8	208	155	19 2	212	167	19 4	210	159	19 3	218	173	19 8	222	185	20 0	217	176	19 7	224	190	20 1	228	202	20 4
	70	200	141	18 8	212	151	19 5	219	158	19 9	210	159	19 3	221	169	20 0	227	176	20 3	217	176	19 7	227	185	20 3	233	193	20 6
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95	65	196	140	19 5	203	157	19 9	208	173	20 2	206	157	20 1	213	175	20 5	217	191	20 8	212	174	20 5	219	191	20 9	223	207	21 2
	70	196	140	19 5	207	153	20 2	214	164	20 6	206	157	20 1	216	171	20 7	222	182	21 1	212	174	20 5	222	187	21 1	227	199	21 4
	75	196	140	19 5	212	148	20 5	222	154	21 1	206	157	20 1	220	166	21 0	229	172	21 5	212	174	20 5	225	182	21 3	233	189	21 8
	78	196	140	19 5	214	145	20 6	227	148	21 4	206	157	20 1	222	163	21 1	233	166	21 7	212	174	20 5	228	179	21 4	–	–	–
	80	196	140	19 5	216	143	20 8	230	144	21 6	206	157	20 1	224	160	21 2	236	162	21 9	212	174	20 5	229	177	21 5	–	–	–
100	70	192	137	20 1	202	155	20 9	209	170	21 3	201	155	20 8	211	172	21 5	217	188	21 8	207	172	21 2	216	189	21 8	222	204	22 2
	75	192	137	20 2	207	150	21 2	216	160	21 8	201	155	20 8	214	168	21 7	223	178	22 2	207	172	21 2	220	184	22 0	227	195	22 5
	78	192	137	20 2	209	147	21 4	221	154	22 1	201	155	20 8	217	164	21 9	227	172	22 5	207	172	21 2	222	181	22 2	–	–	–
105	70	187	135	20 9	197	157	21 6	204	176	22 1	196	153	21 5	205	174	22 2	212	193	22 6	202	169	21 9	211	191	22 5	217	210	22 9
	75	187	135	20 9	201	152	21 9	211	166	22 6	196	153	21 5	209	169	22 4	217	184	23 0	202	169	21 9	214	186	22 8	221	201	23 3
110	78	183	133	21 6	199	150	22 8	210	166	23 6	191	151	22 2	206	168	23 3	215	184	24 0	197	167	22 6	210	185	23 6	–	–	–
115	75	178	131	22 3	191	155	23 3	200	178	24 0	186	149	22 9	198	173	23 8	206	195	24 4	191	165	23 3	202	189	24 1		–	–

48MA/50ME028

OUTDOOR AIR TEMP		TOTAL UNIT CFM																					
		7,000 Outdoor Air Cfm									9,000 Outdoor Air Cfm								11,000 Outdoor Air Cfm				
		0			1000			2000			0			1000			2000			0			1000			2000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	265	190	24 0	275	203	24 6	280	213	24 8	277	213	24 6	287	226	25 2	291	236	25 4	285	234	25 1	294	248	25 6	298	258	25 8
	70	265	190	24 0	280	197	24 8	289	201	25 3	277	213	24 6	291	220	25 4	298	224	25 8	285	234	25 1	298	242	25 8	305	246	26.1
90	65	259	188	24 9	269	206	25 5	273	221	25 7	271	210	25 6	280	229	26 1	284	244	26 3	278	232	26 0	287	250	26 5	291	266	26 7
	70	259	188	24 9	274	200	25 8	282	209	26 2	271	210	25 6	284	223	26 3	291	232	26 7	278	232	26 0	291	244	26 7	297	254	27 1
	73	259	188	24 9	277	196	25 9	287	201	26 5	271	210	25 6	287	219	26 5	296	225	27 0	278	232	26 0	293	241	26 9	302	246	27 3
	75	259	188	24 9	279	193	26	291	196	26 7	271	210	25 6	289	216	26 6	299	219	27 2	278	232	26 0	295	238	27 0	304	241	27 5
95	65	254	185	25 8	262	208	26 4	267	229	26 6	264	208	26 5	273	231	27 0	277	252	27 2	272	229	26 9	280	252	27 4	283	273	27 6
	70	254	185	25 8	267	202	26 7	275	217	27	264	208	26 5	277	225	27 3	284	240	27 7	272	229	26 9	284	247	27 7	290	262	28 0
	75	254	185	25 8	273	196	27 0	284	204	27 7	264	208	26 5	282	219	27 5	292	227	28 1	272	229	26 9	288	240	27 9		–	–
	78	254	185	25 8	276	192	27 2	290	196	28 0	264	208	26 5	285	214	27 7	297	219	28 4	272	229	26 9	291	236	28 1	–	–	–
	80	254	185	25 8	279	189	27 3	294	190	28 3	264	208	26 5	287	212	27 8	–	–	–	272	229	26 9	292	233	28 2	–	–	–
100	70	248	182	26 7	261	205	27 6	268	225	28 0	258	205	27 4	270	228	28 2	276	248	28 6	265	226	27 8	276	249	28 6	282	269	28 9
	75	248	182	26 7	266	198	27 9	277	212	28 6	258	205	27 4	275	221	28 5	284	235	29 1	265	226	27 8	280	243	28 8	–	–	–
	78	248	182	26.7	269	194	28 1	283	203	29.0	258	205	27 4	277	217	28 6	–	–	–	265	226	27 8	283	239	29 0	–	–	–
105	70	242	180	27 6	254	207	28 4	261	233	28 9	252	202	28 3	263	230	29 0	269	255	29 5	258	223	28 7	269	252	29 5	274	274	29 8
	75	242	180	27 6	259	201	28 8	270	220	29 5	252	202	28 3	267	224	29 3	276	243	30 0	258	223	28 7	273	245	29 7	–	–	–
110	78	236	177	28 4	256	199	29 9	268	219	30 8	245	199	29 1	263	222	30 4	–	–	–	251	221	29 6	268	243	30 8	–	–	–
115	75	230	174	29 2	246	206	30 4	256	236	31 2	239	197	29 9	253	229	31 0	262	258	31 7	245	218	30 3	258	250	31 4	–	–	–

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1. No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction.

PERFORMANCE DATA

Room Design 78 F/50% Rh

COOLING CAPACITIES

48MA/50ME016

OUTDOOR AIR TEMP		TOTAL UNIT CFM 5,000 Outdoor Air Cfm 0			750			1500			6,000 0			750			1500			7,000 0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	183	132	15 5	186	141	15 7	188	148	15 8	188	144	15 8	192	153	16 0	193	160	16 0	192	156	16 0	195	164	16 1	197	171	16 2
	70	183	132	15.5	190	136	15.9	194	139	16.1	188	144	15.8	194	148	16.1	198	151	16.3	192	156	16.0	198	160	16.3	202	163	16.4
90	65	178	131	16 1	182	143	16 3	183	154	16 4	183	143	16 4	187	155	16 5	188	166	16 6	187	154	16 6	190	166	16 7	192	177	16 8
	70	178	131	16 1	185	138	16 5	189	145	16 7	183	143	16 4	189	150	16 7	193	157	16 9	187	154	16 6	193	162	16 9	196	169	17 0
	73	178	131	16 1	187	136	16 6	193	139	16 9	183	143	16 4	191	148	16 8	196	151	17 0	187	154	16 6	194	159	16 9	199	163	17 2
	75	178	131	16.1	188	134	16.6	195	135	17.0	183	143	16.4	193	146	16.9	198	148	17.2	187	154	16.6	196	157	17.0	201	159	17.3
95	65	174	129	16 7	177	145	16 9	179	160	17 0	178	141	17 0	182	157	17 1	183	172	17 2	182	152	17 1	185	168	17 3	186	184	17 4
	70	174	129	16 7	180	140	17 0	184	151	17 3	178	141	17 0	184	152	17 3	188	163	17 5	182	152	17 1	188	164	17 5	191	175	17 6
	75	174	129	16 7	183	136	17 2	190	141	17 6	178	141	17 0	187	148	17 4	193	154	17 8	182	152	17 1	190	159	17 6	195	165	17 9
	78	174	129	16 7	186	133	17 4	194	135	17 7	178	141	17 0	189	145	17 6	–	–	–	182	152	17 1	192	156	17 7	–	–	–
	80	174	129	16.7	187	130	17.4	196	131	17.8	178	141	17.0	191	142	17.6	–	–	–	182	152	17 1	193	154	17 8	–	–	–
100	70	169	127	17 3	175	143	17 6	179	157	17 8	174	139	17 5	179	155	17 9	183	169	18 1	177	150	17 7	182	166	18 0	185	181	18 2
	75	169	127	17 3	178	138	17 8	185	148	18 2	174	139	17 5	182	150	18 0	188	160	18 3	177	150	17 7	185	161	18 2	–	–	–
	78	169	127	17.3	181	135	17.9	188	141	18.4	174	139	17.5	181	147	18.1	–	–	–	177	150	17.7	187	158	18.3	–	–	–
105	70	165	125	17 8	170	145	18 2	174	163	18 4	169	137	18 1	174	157	18 4	177	175	18 6	172	148	18 3	177	168	18 6	180	180	18 8
	75	165	125	17.8	173	140	18.4	179	154	18.8	169	137	18.1	177	152	18.6	182	166	18.9	172	148	18.3	179	163	18.8	–	–	–
110	78	160	123	18.4	170	139	19.1	178	154	19.5	164	135	18.6	174	151	19.3	–	–	–	167	146	18.8	176	162	19.1	–	–	–
115	75	156	121	18 9	164	144	19 5	169	166	19 9	159	133	19 2	167	156	19 7	–	–	–	162	144	19 4	169	168	19 9	–	–	–

48MA/50ME024

OUTDOOR AIR TEMP		TOTAL UNIT CFM 6,000 Outdoor Air Cfm 0			750			1500			7,500 0			750			1500			9,000 0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	220	158	18 9	227	167	19 2	230	175	19 4	228	176	19 3	235	185	19 6	238	193	19 8	234	192	19 6	240	202	19 9	243	210	20 1
	70	220	158	18.9	231	163	19.4	236	167	19.7	228	176	19.3	238	181	19.8	243	184	20.1	234	192	19.6	243	198	20.1	248	201	20.3
90	65	216	156	19 7	222	169	20 0	225	181	20 2	223	174	20 1	229	187	20 4	233	199	20 6	229	190	20 4	234	204	20 7	238	215	20 9
	70	216	156	19 7	226	165	20 2	231	172	20 5	223	174	20 1	233	183	20 6	238	190	20 9	229	190	20 4	238	200	20 9	242	207	21 2
	73	216	156	19 7	228	163	20 4	235	167	20 8	223	174	20 1	235	180	20 7	241	185	21 1	229	190	20 4	240	197	21 0	246	202	21 3
	75	216	156	19.7	230	161	20.5	238	163	20.9	223	174	20.1	236	178	20.8	244	181	21.2	229	190	20 1	241	195	21.1	249	198	21 5
95	65	211	154	20 4	217	171	20 8	220	187	21 0	218	172	20 9	224	189	21 2	228	201	21 4	223	188	21 2	230	206	21 5	233	221	21 8
	70	211	154	20 4	220	167	21 0	226	178	21 3	218	172	20 9	227	185	21 4	232	196	21 7	223	188	21 2	232	201	21 7	236	213	22 0
	75	211	154	20 4	224	163	21 2	232	169	21 7	218	172	20 9	231	180	21 6	238	187	22 0	223	188	21 2	235	197	21 9	242	204	22 3
	78	211	154	20 4	227	160	21 4	237	163	22 0	218	172	20 9	233	177	21 8	242	181	22 3	223	188	21 2	237	194	22 0	–	–	–
	80	211	154	20.4	229	157	21.5	240	159	22.2	218	172	20.9	235	175	21.9	244	176	22 1	223	188	21.2	239	192	22 1	–	–	–
100	70	206	152	21 2	215	169	21 7	220	184	22 1	213	170	21 6	220	187	22 2	227	202	22 5	218	186	21 9	226	203	22 5	231	218	22 8
	75	206	152	21 2	219	164	22 0	227	175	22 5	213	170	21 6	225	182	22 4	232	193	22 8	218	186	21 9	229	199	22 7	236	209	23 1
	78	206	152	21.2	221	161	22 2	231	169	22 8	213	170	21 6	227	179	22 5	236	187	23 1	218	186	21 9	231	196	22 8	–	–	–
105	70	201	150	21 9	210	171	22 5	215	190	22 9	208	167	22 4	216	188	22 9	224	207	23 3	213	184	22 7	221	205	23 2	226	224	23 6
	75	201	150	21.9	213	166	22.7	221	181	23.2	208	167	22.4	219	184	23 1	226	198	23 6	213	184	22 7	223	201	23 1	229	215	23 8
110	78	196	148	22.6	210	165	23.6	219	181	24.2	203	165	23.1	216	183	24.0	223	198	24.6	207	182	23.3	219	199	24.3	–	–	–
115	75	191	146	23 3	202	170	24 1	210	192	24 7	197	163	23 8	207	187	24 5	214	209	25 1	202	180	24 1	211	204	24 8	–	–	–

48MA/50ME028

OUTDOOR AIR TEMP		TOTAL UNIT CFM 8,000 Outdoor Air Cfm 0			1000			2000			10,000 0			1000			2000			12,000 0			1000			2000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	282	205	24 9	290	218	25 4	294	227	25 6	292	228	25 4	300	241	25 9	303	251	26 0	298	250	25 8	306	262	26 2	309	272	26 4
	70	282	205	24.9	295	212	25.6	302	216	26.0	292	228	25.4	304	235	26.1	310	239	26.4	298	250	25.8	310	257	26.4	316	261	26.7
90	65	276	203	25 9	284	226	26 3	287	235	26 5	285	225	26 4	293	243	26 9	296	258	27 0	292	247	26 8	299	265	27 2	302	280	27 3
	70	276	203	25 9	288	215	26 6	294	224	26 9	285	225	26 4	297	238	27	302	247	27 4	292	247	26 8	303	259	27 4	308	269	27 7
	73	276	203	25 9	291	211	26 7	299	216	27 2	285	225	26 4	299	234	27 2	301	240	27 6	292	247	26 8	305	256	27 5	312	262	27 9
	75	276	203	25.9	293	208	26.9	303	211	27.4	285	225	26 4	301	231	27.3	310	234	27.8	292	247	26.9	307	253	27.6	314	257	28.0
95	65	270	200	26 8	277	223	27 2	280	243	27 4	279	223	27 3	285	246	27 8	288	266	27 9	285	245	27 7	291	267	28 1	294	288	28 3
	70	270	200	26 8	281	217	27 5	287	232	27 9	279	223	27 3	289	240	28 0	295	255	28 3	285	245	27 7	295	262	28 3	300	277	28 6
	75	270	200	26 8	286	211	27 8	295	219	28 4	279	223	27 3	294	234	28 3	302	242	28 7	285	245	27 7	299	256	28 6	306	264	29 0
	78	270	200	26 8	289	207	28 0	301	211	28 7	279	223	27 3	297	230	28 4	306	234	29 0	285	245	27 7	302	252	28 7	–	–	–
	80	270	200	26.8	292	204	28.1	304	205	28.9	279	223	27.3	299	227	28.3	–	–	–	285	245	27.7	303	249	28.8	–	–	–
100	70	263	197	27 7	274	220	28 4	280	239	28 8	272	220	28 3	282	243	28 9	287	262	29 3	277	242	28 7	287	264	29 3	293	284	29 6
	75	263	197	27 7	279	213	28 7	288	227	29 3	272	220	28 3	286	236	29 2	294	250	29 7	277	242	28 7	291	258	29 5	–	–	–
	78	263	197	27.7	282	209	28.9	293	219	29.6	272	220	28.3	289	232	29.4	298	242	30.0	277	242	28.7	294	254	29.7	–	–	–
105	70	257	195	28 6	267	222	29 3	273	247	29 7	265	217	29 2	275	245	29 8	279	270	30 2	270	239	29 6	280	267	30 2	284	284	30 5
	75	257	195	28.6	272	216	29.7	280	235	30.2	265	217	29.2	279	239	30.1	284	258	30.6	270	239	29.6	283	261	30.5	–	–	–
110	78	251	192	29.5	268	215	30.7	278	235	31.3	258	215	30.1	274	237	31.2	–	–	–	263	236	30.4	278	259	31.5	–	–	–
115	75	244	189	30 3	258	221	31 4	266	251	32 0	25.	212	30 9	264	244	31 8	271	271	32 4	256	234	31 3	268	266	32 2	–	–	–

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

PERFORMANCE DATA

Room Design 80 F/50% Rh

COOLING CAPACITIES

48MA/50ME016

OUTDOOR AIR TEMP		TOTAL UNIT CFM 5,000 Outdoor Air Cfm 0			750			1500			6,000 0			750			1500			7,000 0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	188	133	15 8	191	141	15 9	192	148	16 0	193	146	16 0	196	153	16 2	197	160	16 2	197	157	16 2	199	165	16 3	201	172	16 4
	70	188	133	15.8	194	137	16.1	197	139	16.2	193	146	16.0	199	149	16.3	202	152	16.4	197	157	16.2	202	161	16.5	205	164	16.6
90	65	183	131	16 4	186	143	16 5	187	154	16 6	188	144	16 6	191	156	16 8	192	167	16 8	192	155	16 8	194	167	16 9	195	178	17 0
	70	183	131	16 4	189	139	16 7	192	146	16 8	188	144	16 6	194	151	16 9	197	158	17 1	192	155	16 8	197	163	17 1	200	170	17 2
	73	183	131	16 4	191	136	16 8	196	140	17 0	188	144	16 6	195	149	17 0	200	152	17 2	192	155	16 8	199	160	17 2	202	164	17 4
	75	183	131	16.4	192	134	16.8	198	136	17.1	188	144	16.6	197	147	17.1	202	149	17.3	192	155	16.8	200	159	17.2	204	161	17.5
95	65	179	130	17 0	181	145	17 1	182	160	17 1	183	142	17 2	186	158	17.3	186	173	17 4	187	153	17 4	189	169	17 5	190	184	17 6
	70	179	130	17 0	184	141	17 3	187	152	17 4	183	142	17 2	188	153	17 5	191	164	17 7	187	153	17 4	191	165	17 7	194	176	17 8
	75	179	130	17 0	187	137	17 4	193	142	17 7	183	142	17 2	191	149	17 7	196	155	17 9	187	153	17 4	194	161	17 8	199	167	18 1
	78	179	130	17 0	189	134	17 6	197	136	17 9	183	142	17 2	193	146	17 8	199	149	18 1	187	153	17 4	196	158	17 9	–	–	–
	80	179	130	17.0	191	131	17.6	199	132	18.1	183	142	17.2	195	144	17.8	–	–	–	187	153	17.4	197	155	18.0	–	–	–
100	70	174	128	17 5	179	143	17 5	182	158	18 0	178	140	17 8	183	156	18 1	186	170	18 2	182	151	18 0	186	167	18 3	189	182	18 4
	75	174	128	17 5	182	139	18 0	188	149	18 3	178	140	17 8	186	151	18 2	191	161	18 5	182	151	18 0	189	163	18 4	193	173	18 7
	78	174	128	17.5	184	136	18.1	191	142	18.6	178	140	17.8	188	148	18.4	194	155	18.7	182	151	18.0	190	160	18.5	–	–	–
105	70	169	126	18 1	174	145	18 4	177	164	18 6	173	138	18 4	178	158	18 7	180	176	18 8	176	150	18 6	181	169	18 6	183	183	19 0
	75	169	126	18.1	177	141	18.6	182	155	18.9	173	138	18.4	181	153	18.8	185	167	19.1	176	150	18.6	183	165	19.0	187	179	19.3
110	78	165	124	18.7	174	140	19.3	180	155	19.7	168	136	18.9	177	152	19.5	–	–	–	171	148	19.1	179	164	19.7	–	–	–
115	75	160	122	19.2	167	145	19.7	172	167	20.'	164	134	19.5	170	157	19.9	175	175	20 2	167	146	19 7	173	169	20 1	–	–	–

48MA/50ME024

OUTDOOR AIR TEMP		TOTAL UNIT CFM 6,000 Outdoor Air Cfm 0			750			1500			7,500 0			750			1500			9,000 0			750			1500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	227	159	19 2	232	168	19 5	234	176	19 6	234	177	19 6	240	186	19 9	242	194	20 0	240	194	19 9	245	203	20 2	248	211	20 3
	70	227	159	19.2	236	164	19.7	241	167	20.0	234	177	19.6	243	182	20.1	248	185	20.3	240	194	19.9	249	199	20.4	253	203	20.6
90	65	222	157	20 0	227	170	20 3	229	182	20 4	229	175	20 4	235	188	20 7	237	200	20 9	235	192	20 7	240	205	21 0	243	216	21 2
	70	222	157	20 0	231	166	20 5	235	173	20 8	229	175	20 4	238	184	20 9	242	191	21 2	235	192	20 7	243	201	21 2	247	209	21 4
	73	222	157	20 0	233	164	20 6	239	168	21 0	229	175	20 4	240	181	21 0	246	186	21 4	235	192	20 7	245	199	21 3	250	203	21 6
	75	222	157	20.0	235	162	20 7	242	164	21 2	229	175	20 4	242	180	21 1	248	182	21 5	235	192	20 7	246	197	21 4	253	199	21 7
95	65	217	155	20 8	222	172	21 1	225	187	21 3	224	173	21 2	230	190	21 6	233	205	21 7	229	190	21 5	235	207	21 9	238	222	22 0
	70	217	155	20 8	225	168	21 3	230	179	21 6	224	173	21 2	232	186	21 7	236	197	22 0	229	190	21 5	237	203	22 0	241	214	22 2
	75	217	155	20 8	229	164	21 5	237	170	22 0	224	173	21 2	236	182	21 9	242	188	22 3	229	190	21 5	241	199	22 2	247	205	22 6
	78	217	155	20 8	232	161	21 7	241	164	22 2	224	173	21 2	238	179	22 1	246	182	22 5	229	190	21 5	243	196	22 3	250	199	22 8
	80	217	155	20.8	234	159	21.8	244	160	22.4	224	173	21.2	240	177	22.2	249	178	22.7	229	190	21.5	244	194	22.4	–	–	–
100	70	212	153	21 6	220	170	22 1	224	185	22 3	219	171	22 0	227	188	22 5	231	203	22 8	224	188	22 3	231	205	22 8	236	220	23 1
	75	212	153	21 6	224	166	22 3	231	176	22 7	219	171	22 0	230	183	22 7	236	194	23 1	224	188	22 3	234	200	23 0	240	211	23 3
	78	212	153	21.6	226	163	22.5	235	170	23.0	219	171	22.0	232	181	22.9	240	188	23 3	224	188	22.3	237	198	23 1	244	205	23.6
105	70	207	151	22 3	215	172	22 8	219	191	23 1	214	169	22 8	221	190	23 3	226	208	23 6	218	186	23 1	226	207	23 6	230	225	23 9
	75	207	151	22.3	218	167	23.1	225	182	23.5	214	169	22.8	224	185	23.5	230	200	23.9	218	186	23 1	228	202	23 7	234	217	24.1
110	78	202	149	23.0	215	166	23.9	223	182	24.5	208	167	23.5	220	184	24.3	227	200	24.9	213	184	23.8	224	201	24.6	–	–	–
115	75	197	147	23.7	207	171	24.5	214	193	25.0	203	165	24.2	212	189	24.9	219	211	25.4	207	181	24.5	216	206	25.2	222	222	25.6

48MA/50ME028

OUTDOOR AIR TEMP		TOTAL UNIT CFM 8,000 Outdoor Air Cfm 0			1000			2000			10,000 0			1000			2000			12,000 0			1000			2000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	290	207	25 4	297	218	25 7	299	228	25 8	300	230	25 9	306	242	26 2	309	252	26 3	306	252	26 2	313	264	26 6	315	274	26 7
	70	290	207	25.4	302	213	26.0	307	217	26.3	300	230	25.9	311	237	26.4	316	241	26.7	306	252	26.2	317	259	26 8	322	263	27 0
90	65	284	204	26 3	290	221	26 7	292	236	26 8	293	227	26 8	299	244	27 2	301	260	27 3	299	249	27 2	305	267	27 5	308	282	27 7
	70	284	204	26 3	295	216	26 9	300	225	27 2	293	227	26 8	303	239	27 4	308	248	27 7	299	249	27 2	309	261	27 7	314	271	28 0
	73	284	204	26 3	298	212	27 1	305	218	27 5	293	227	26 8	306	236	27 6	312	241	27 9	299	249	27 2	312	258	27 9	318	264	28 2
	75	284	204	26.3	300	210	27.2	308	212	27.7	293	227	26.8	308	233	27.7	315	236	28.1	299	249	27.2	313	255	28 3	320	259	28.4
95	65	277	201	27 3	283	224	27 6	285	244	27 7	286	225	27 8	292	247	28 1	294	267	28 3	292	247	28 2	298	269	28 5	300	289	28 6
	70	277	201	27 3	288	218	27 9	292	233	28 2	286	225	27 8	296	242	28 4	300	256	28 6	292	247	28 2	301	264	28 7	306	279	29 0
	75	277	201	27 3	292	212	28 2	301	220	28 7	286	225	27 8	300	236	28 6	307	244	29 1	292	247	28 2	305	258	29 0	312	266	29 4
	78	277	201	27 3	295	208	28 4	306	212	29 0	286	225	27 8	303	232	28 8	312	236	29 3	292	247	28 2	308	254	29 1	–	–	–
	80	277	201	27.3	298	206	28.5	309	207	29.2	286	225	27.8	305	229	28.9	315	231	29.5	292	247	28 2	310	251	29 2	–	–	–
100	70	271	199	28 2	280	221	28 8	285	241	29 1	279	222	28 7	288	244	29 3	292	264	29 6	285	244	29 1	294	266	29 7	298	286	29 9
	75	271	199	28 2	285	215	29 1	293	228	29 6	279	222	28 7	292	238	29 6	299	252	30 0	285	244	29 1	298	260	29 9	304	274	30 3
	78	271	199	28.2	288	211	29.3	298	220	30.0	279	222	28.7	295	234	29.8	304	244	30 3	285	244	29 1	300	257	30 1	–	–	–
105	70	264	196	29 1	273	224	29 7	277	248	30 0	272	219	29 7	281	247	30 3	285	272	30 5	278	241	30 1	286	269	30 6	290	290	30 9
	75	264	196	29.1	278	217	30.1	285	236	30.6	272	219	29.7	285	241	30.5	291	260	31 0	278	241	30 1	290	263	30 9	296	282	31 3
110	78	258	194	30.0	273	216	31.2	282	236	31.8	265	217	30.6	280	239	31.6	288	260	32 2	270	239	31 0	284	262	32 0	–	–	–
115	75	251	191	30 8	263	223	31 8	270	252	32 3	258	214	31 4	270	246	32 3	276	275	32 8	263	236	31 8	274	268	32 6	–	–	–

Kw — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES: 1. No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2. Ratings are gross and do not include fan motor heat deduction

PERFORMANCE DATA

Room Design 75 F/50% Rh

COOLING CAPACITIES

48MA/50ME030

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		8,000 Outdoor Air Cfm												10,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	298	215	29 7	311	229	30 5	317	240	30 9	319	245	31 0	309	238	30 4	322	252	31 2	328	263	31 6	330	267	31 7
	70	298	215	29 7	317	223	30 9	326	228	31.5	329	230	31 7	309	238	30 4	327	246	31.5	335	251	32 1	339	253	32.3
90	65	292	212	30 7	304	231	31 6	309	247	31 9	312	254	32 1	303	235	31 5	315	254	32.3	320	270	32 7	322	277	32 8
	70	292	212	30 7	309	225	31 9	318	235	32 5	322	240	32 8	303	235	31 5	320	248	32.6	328	258	33 1	331	263	33 3
	73	292	212	30 7	313	222	32 2	324	228	32 9	328	230	33 2	303	235	31 5	323	245	32.8	332	251	33 5	336	253	33 7
	75	292	212	30 7	315	219	32 3	328	222	33.2	333	234	33.5	303	235	31 5	325	242	33.0	336	245	33.7	340	246	34.0
95	65	285	209	31 8	297	234	32 6	303	255	33 0	305	264	33 2	296	232	32 5	307	256	33.3	314	277	33 8	316	286	33 9
	70	285	209	31 8	302	228	33 0	311	243	33 6	314	250	33 8	296	232	32 5	312	251	33 7	319	266	34 2	322	273	34.4
	75	285	209	31.8	308	222	33 4	320	230	34 2	325	234	34 6	296	232	32 5	317	244	34 0	328	253	34 8	332	257	35 1
	78	285	209	31 8	311	217	33 6	326	222	34 7	332	223	35 1	296	232	32 5	320	240	34 2	333	244	35.1	–	–	–
	80	285	209	31 8	314	215	33 8	330	216	34 9	337	216	35 4	296	232	32 5	322	237	34 4	336	238	35 4	–	–	–
100	70	279	207	32 8	295	230	34 0	303	250	34 6	307	260	34 9	289	229	33.5	304	253	34 7	312	273	35 2	315	282	35 5
	75	279	207	32 8	300	224	34 4	312	237	35 3	317	244	35 6	289	229	33 5	304	246	35 0	319	260	35 8	324	267	36 1
	78	279	207	32.8	303	220	34.7	318	229	35.7	324	234	36.1	289	229	33.5	312	242	35.3	324	252	36.2	–	–	–
105	70	273	204	33 7	288	232	34 9	297	258	35 7	300	269	35 9	282	226	34 5	296	255	35 6	305	280	36 3	308	291	36 6
	75	273	204	33 7	293	226	35.4	304	245	36.3	309	254	36.6	282	226	34.5	301	249	36.0	311	268	36.8	315	276	37.1
110	78	266	201	34 6	289	224	36.6	303	244	37.7	308	254	38 1	276	223	35.4	297	247	37.2	–	–	–	–	–	–
115	75	261	199	35 5	279	231	37 1	291	260	38 2	296	274	38 6	270	220	36 3	287	253	37 8	297	282	38 7	302	296	39 1

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		11,000 Outdoor Air Cfm												12,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	314	248	30 7	326	263	31 5	332	273	31 8	334	278	31 9	317	259	30 9	330	273	31 7	335	284	32 0	337	289	32 1
	70	314	248	30.7	331	257	31.8	339	262	32.3	312	264	32.5	317	259	30.9	334	268	32.0	342	272	32.5	345	274	32.7
90	65	307	245	31 8	319	265	32 5	324	281	32 9	326	288	33 1	310	256	32 0	322	275	32 8	328	291	33 1	330	298	33 3
	70	307	245	31 8	323	259	32 9	331	269	33 4	334	274	33 6	310	256	32 0	327	270	33 1	334	280	33 6	337	284	33.8
	73	307	245	31 8	326	256	33 1	336	261	33 7	339	264	33 9	310	256	32 0	329	266	33 3	338	272	33 9	342	275	34.1
	75	307	245	31.8	328	253	33.2	339	256	33.9	343	257	34.2	310	256	32.0	331	263	33.4	341	267	34.1	345	268	34.3
95	65	300	242	32 8	311	267	33 9	317	287	34 1	319	297	34 2	303	253	33 0	314	277	33 9	321	298	34 3	323	307	34 4
	70	300	242	32 8	315	261	33 9	323	276	34 4	325	283	34 6	303	253	33 0	319	272	34 1	326	287	34 6	328	294	34 8
	75	300	242	32 8	321	255	34 3	330	263	35 0	334	267	35 2	303	253	33 0	323	265	34 5	333	274	35.1	–	–	–
	78	300	242	32 8	323	251	34 5	335	255	35 3	–	–	–	303	253	33 0	326	261	34 7	–	–	–	–	–	–
	80	300	242	32.8	325	249	34.6	–	–	–	–	–	–	303	253	33.0	328	258	34.8	–	–	–	–	–	–
100	70	293	240	33 8	307	263	34 9	315	283	35 5	318	292	35 7	296	250	34 1	310	274	35 2	318	294	35 7	321	303	35 9
	75	293	240	33 8	312	257	35 3	322	271	36 0	326	277	36 3	296	250	34 1	315	268	35 5	324	281	36 2	–	–	–
	78	293	240	33.8	315	253	35.5	327	263	36.4	–	–	–	296	250	34.1	318	263	35.7	–	–	–	–	–	–
105	70	286	237	34 8	300	266	35 9	309	290	36 6	311	302	36 8	289	247	35 1	303	276	36 1	311	300	36 8	314	312	37 0
	75	286	237	34.8	304	259	36.3	313	278	37.0	–	–	–	289	247	35.1	367	270	36.5	316	289	37.2	–	–	–
110	78	279	234	35.7	300	257	37.4	–	–	–	–	–	–	282	244	36.0	302	268	37.6	–	–	–	–	–	–
115	75	273	231	36 6	289	264	38 0	300	293	38 9	–	–	–	276	241	36 8	292	275	38 3	–	–	–	–	–	–

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1. No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

COOLING CAPACITIES

48MA/50ME030

PERFORMANCE DATA

Room Design 78 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		8,000 Outdoor Air Cfm												10,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	310	217	30 5	321	231	31 2	325	241	31 4	327	246	31.5	321	241	31 2	333	254	31 9	337	265	32 2	338	269	32 2
	70	310	217	30.5	327	226	31 5	334	230	32.0	337	232	32.2	321	241	31.2	338	249	32.2	345	253	32.6	347	255	32.8
90	65	304	215	31 5	314	234	32 2	318	249	32 5	320	256	32 6	315	238	32 3	325	257	33 0	329	272	33 3	331	279	33 4
	70	304	215	31 5	319	228	32 6	327	237	33.1	329	242	33 3	315	238	32 3	330	251	33 3	336	261	33 7	339	265	33 9
	73	304	215	31 5	323	224	32 8	332	230	33 5	336	232	33 7	315	238	32 3	333	248	33 5	341	253	34 1	344	256	34 3
	75	304	215	31.5	325	222	33.0	336	225	33.7	340	226	34.0	315	238	32.3	335	245	33.6	345	248	34.3	348	250	34.5
95	65	297	212	32 6	307	236	33 3	312	256	33 7	313	266	33 8	308	235	33 4	318	259	34 1	323	279	34 4	324	288	34 5
	70	297	212	32 6	312	230	33 7	319	245	34 2	321	252	34 3	308	235	33 4	322	253	34 4	328	268	34 8	330	275	35 0
	75	297	212	32 6	317	224	34 1	328	232	34 8	332	236	35 1	308	235	33 4	327	247	34 7	336	256	35 4	340	260	35.6
	78	297	212	32 6	321	220	34 3	334	224	35 2	339	226	35 6	308	235	33 4	330	243	34 9	341	248	35 7	346	250	36 0
	80	297	212	32.6	324	217	34.5	338	218	35.5	344	219	35.9	308	235	33.4	332	241	35.1	345	242	36.0	350	243	36.3
100	70	291	209	33 7	304	233	34 7	311	252	35 2	314	262	35 4	301	232	34 4	314	256	35 4	321	275	35 9	323	284	36 1
	75	291	209	33 7	310	226	35 :	320	240	35 9	324	246	36 2	301	232	34 4	319	250	35 8	328	263	36 4	331	270	36 7
	78	291	209	33.7	313	222	35.4	326	232	36.3	331	236	36.7	301	232	34.4	322	246	36.0	333	255	36.8	337	260	37.1
105	70	284	206	34 7	297	235	35 7	305	260	36 3	308	271	36 5	294	229	35 4	306	258	36 4	314	283	37 0	316	294	37 2
	75	284	206	34.7	302	229	36.1	312	248	36.9	316	256	37.2	294	229	35.4	311	252	36.8	320	271	37.5	323	279	37.7
110	78	278	204	35.6	298	227	37.3	310	247	38.3	315	257	38.7	287	226	36.4	306	250	38.0	316	271	38.8	320	280	39.1
115	75	272	201	36 5	288	234	37.9	298	263	38.8	303	277	39.2	280	224	37 3	296	257	38.6	305	285	39.5	309	299	39.8

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		11,000 Outdoor Air Cfm												12,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	326	252	31 4	337	265	32 1	341	276	32 4	342	280	32 5	329	262	31 7	340	276	32 4	344	287	32 6	346	291	32 7
	70	326	252	31.4	342	260	32.4	348	265	32.9	351	266	33.0	329	262	31.7	345	271	32.7	351	275	33.1	354	277	33.2
90	65	319	249	32 6	329	267	33 2	334	283	33 5	335	290	33 6	322	260	32 8	332	279	33 5	337	294	33.8	339	301	33 9
	70	319	249	32 6	333	262	33 5	340	272	34 0	342	276	34 1	322	260	32 8	337	273	33 7	343	283	34 2	345	287	34 3
	73	319	249	32 6	336	259	33 7	345	265	34 3	348	267	34 5	322	260	32 8	339	269	33 9	397	276	34.5	350	278	34 7
	75	319	249	32.6	338	256	33.9	348	260	34.5	351	261	34.7	322	260	32.8	341	267	34.1	351	271	34.7	354	271	34.9
95	65	312	246	33 6	322	270	34 4	327	290	34 7	328	299	34 8	315	257	33 9	325	281	34 6	330	301	34 9	332	309	35 0
	70	312	246	33 6	325	264	34 6	332	279	35 1	334	286	35 2	315	257	33 9	328	275	34 8	335	290	35 3	337	297	35 4
	75	312	246	33 6	330	258	35 0	339	267	35 6	343	271	35 8	315	257	33 9	333	269	35 2	342	278	35 8	345	282	36 0
	78	312	246	33 6	333	254	35 2	344	259	35 9	348	261	36 2	315	257	33 9	336	265	35 4	346	270	36 1	–	–	–
	80	312	246	33.6	335	252	35.3	347	253	36.2	–	–	–	315	257	33.9	338	262	35.5	349	264	36.3	–	–	–
100	70	304	243	34 7	317	267	35 7	324	286	36 2	327	295	36 3	308	254	34 9	320	277	35.9	327	297	36 4	329	306	36 6
	75	304	243	34 7	322	261	36 0	331	274	36 7	334	281	36 9	308	254	34 9	325	271	36 2	333	285	36 8	336	292	37 1
	78	304	243	34.7	325	257	36.7	335	266	37.0	339	271	37 3	308	254	34.9	328	267	36.4	338	277	37.2	–	–	–
105	70	297	240	35 7	310	269	36 7	317	294	37 3	320	305	37 5	301	251	36 0	313	280	36 9	320	304	37 5	322	315	37 7
	75	297	240	35.7	314	263	37.0	322	282	37.7	325	290	37.9	301	251	36.0	317	274	37.2	325	203	37.9	327	301	38.1
110	78	290	238	36.7	309	261	38.2	319	282	39.0	–	–	–	294	248	36.9	312	272	38.4	321	292	39.2	–	–	–
115	75	284	235	37 6	299	268	38 9	308	296	39 7	312	310	40 0	287	246	37.8	301	279	39 1	310	307	39.9	314	314	40.2

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

Room Design 80 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		8,000 Outdoor Air Cfm												10,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	319	218	31 0	329	231	31 6	332	241	31 8	332	246	31 9	330	241	31 7	340	255	32 4	343	265	32 6	344	269	32 6
	70	319	218	31.0	334	226	32.0	341	230	32.4	343	232	32.5	330	241	31.7	345	249	32.7	351	254	33.1	353	256	33.2
90	65	312	215	32 1	321	233	32 7	325	249	33 0	326	256	33 0	323	238	32 9	332	257	33 5	336	272	33 7	337	279	33 8
	70	312	215	32 1	327	228	33 1	333	238	33 5	335	242	33 6	323	238	32 9	337	252	33 8	343	261	34 2	345	266	34 3
	73	312	215	32 1	330	225	33 3	338	230	33 9	341	233	34 1	323	238	32 9	340	248	34 0	346	254	34 5	350	257	34 7
	75	312	215	32.1	332	222	33.5	342	225	34.1	346	227	34.4	323	238	32.9	342	246	34.1	351	249	34.7	354	250	34.9
95	65	306	212	33 2	315	236	33 8	318	256	34 1	319	257	34 2	316	236	34 0	325	259	34 6	329	279	34 9	330	289	35 0
	70	306	212	33 2	319	231	34 2	325	245	34.6	327	252	34 7	316	236	34 0	329	254	34 9	335	269	35 3	336	275	35 4
	75	306	212	33 2	325	225	34 6	334	233	35 2	338	237	35 5	316	236	34 0	334	248	35 2	342	257	35 8	346	261	36 0
	78	306	212	33 2	328	221	34 8	340	225	35 6	344	227	35 9	316	236	34 0	337	244	35 4	348	249	36 2	351	251	36 4
	80	306	212	33.2	331	218	35.0	344	219	35.9	349	220	36.3	316	236	34.0	339	241	35.6	351	243	36.4	356	244	36.7
100	70	299	210	34 3	311	233	35 2	318	253	35 7	320	262	35 8	309	233	35 0	321	256	35 9	327	276	36 4	329	285	36 5
	75	299	210	34 3	317	227	35.6	326	241	36 3	329	247	36 6	309	233	35 0	326	250	36 3	334	264	36 9	337	271	37 1
	78	299	210	34.3	320	223	35.9	332	233	36.7	336	237	37.0	309	233	35.0	329	246	36.5	339	256	37.3	343	261	37.6
105	70	292	207	35 3	304	235	36 2	311	260	36 8	313	272	37 0	302	230	36 1	314	258	37 0	320	283	37 5	322	295	37 7
	75	292	207	35.3	309	229	36.6	318	248	37.3	321	257	37.6	302	230	36.1	318	253	37.3	326	272	37.9	328	280	38.2
110	78	266	201	35.6	305	228	37.9	316	248	38.8	319	258	39.1	295	227	37.1	313	251	38.6	322	272	39.3	326	281	39.6
115	75	261	198	35.5	295	234	38.5	304	263	39.3	308	277	39.7	288	225	38 0	303	258	39.2	311	286	40.0	315	300	40.3

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		11,000 Outdoor Air Cfm												12,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	335	252	32 0	344	266	32 6	348	276	32 8	348	280	32 9	338	263	32 2	348	277	32 8	351	287	33 1	352	291	33 1
	70	335	252	32.0	349	260	32.9	355	265	33.3	357	267	33.4	338	263	32.2	352	271	33.1	358	276	33.5	360	278	33 6
90	65	327	249	33 1	336	268	33 7	340	283	34 0	342	290	34 1	331	260	33 4	340	279	34 0	344	294	34 2	345	301	34 3
	70	327	249	33 1	341	263	34 0	347	273	34 4	348	277	34 5	331	260	33 4	344	274	34 2	350	284	34 6	352	288	34 7
	73	327	249	33 1	344	259	34 2	351	265	34 7	354	268	34 9	331	260	33 4	347	270	34 4	354	276	34 9	357	279	35 1
	75	327	249	33.1	346	257	34.4	354	260	34.9	357	262	35.1	331	260	33 4	349	268	34 6	357	272	35 1	360	273	35 3
95	65	320	247	34 2	329	270	34 9	334	290	35 2	335	299	35 3	323	257	34 5	333	281	35 1	337	301	35 4	338	310	35 5
	70	320	247	34 2	333	265	35 1	338	280	35 5	340	286	35 6	323	257	34 5	336	276	35 4	341	291	35 7	343	298	35 8
	75	320	247	34 2	338	259	35 5	346	268	36 0	349	272	36 2	323	257	34 5	340	270	35 7	348	279	36 2	251	283	36 4
	78	320	247	34 2	341	255	35 7	350	260	36 4	354	262	36 6	323	257	34 5	343	266	35 9	353	271	36 5	356	273	36 8
	80	320	247	34.2	343	253	35.8	354	255	36.6	358	255	36.9	323	257	34.5	345	264	36.0	356	266	36.8	--	--	--
100	70	313	244	35 3	325	267	36 2	331	287	36 6	333	296	36 8	316	255	35 6	328	278	36 4	334	298	36 9	336	307	37 0
	75	313	244	35 3	329	261	36 5	337	275	37 1	340	282	37 3	316	255	35 6	332	272	36 8	340	286	37 3	342	293	37 5
	78	313	244	35.3	332	258	36.8	342	268	37.5	345	272	37.7	316	255	35.6	335	269	37.0	344	279	37.6	347	283	37.9
105	70	306	241	36 4	317	270	37 3	323	294	37 8	326	306	37 9	309	252	36 6	320	280	37 5	326	306	38 0	328	316	38 2
	75	306	241	36.4	321	264	37.6	329	283	38.2	331	291	38.4	309	252	36 6	324	275	37 8	331	294	38 4	334	302	38 6
110	78	298	238	37.3	316	262	38.8	325	282	39.5	328	292	39.8	301	249	37.6	319	273	39 0	327	294	39 7	–	–	–
115	75	292	236	38 3	306	269	39 5	314	297	40 2	317	311	40 5	295	247	38 5	309	280	39 7	316	308	40 5	319	319	40 7

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

COOLING CAPACITIES

48MA/50ME034

PERFORMANCE DATA

Room Design 75 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM 9,000												10,000									
		Outdoor Air Cfm 0			1000			2000			2500			0			1000			2000			2500	
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	314	231	28 6	326	246	29 2	333	257	29 6	336	262	29 7	320	243	28 9	331	257	29 5	338	268	29 8	341	273	30 0
	70	314	231	28.6	332	240	29.5	342	245	30.0	347	247	30.3	320	243	28.9	337	251	29.8	348	257	30.3	352	259	30.5
90	65	307	228	29 6	318	248	30 3	325	264	30 6	327	272	30 8	313	240	29 9	324	259	30 6	330	276	30 9	338	288	31 3
	70	307	228	29 6	324	242	30 6	334	253	31 1	339	257	31 4	313	240	29 9	329	253	30 9	340	264	31 4	343	269	31 6
	73	307	228	29 6	328	239	30 8	341	245	31 5	346	248	31 7	313	240	29 9	333	250	31.0	345	257	31 7	350	260	32 0
	75	307	228	29.6	330	236	30.9	345	240	31.7	351	242	32.0	313	240	29.9	335	247	31.2	349	251	31.9	355	253	32.2
95	65	300	225	30 7	311	250	31 3	322	275	32 0	325	286	32 2	305	237	31 0	319	264	31 8	328	287	32 3	331	297	32 5
	70	300	225	30 7	316	244	31 6	326	260	32 2	330	267	32 4	305	237	31 0	321	256	31 9	331	271	32 5	335	279	32 7
	75	300	225	30 7	322	238	32 0	336	247	32 8	342	252	33 1	305	237	31 0	327	249	32 3	340	259	33 0	346	263	33 3
	78	300	225	30 7	326	234	32 2	343	239	33 2	350	241	33 6	305	237	31 0	330	245	32 5	347	250	33 4	353	253	33 7
	80	300	225	30.7	329	231	32.4	348	233	33.4	356	234	33.9	305	237	31.0	333	242	32.6	351	245	33.6	–	–	–
100	70	293	222	31 8	308	246	32 7	318	267	33 3	321	277	33 5	298	233	32 1	313	257	33 0	322	279	33 6	326	289	33 8
	75	293	222	31 8	314	240	33 1	328	254	33 9	333	261	34 2	298	233	32 1	318	251	33 3	331	266	34 1	337	273	34 4
	80	293	222	31.8	318	236	33.3	334	246	34.3	341	251	34.7	298	233	32.1	322	247	33.6	338	258	34.5	344	263	34.9
105	70	285	219	32 8	300	248	33 8	314	278	34 7	319	291	35 0	290	230	33 1	304	259	34 1	318	290	35 0	323	302	35 2
	75	285	219	32 8	306	242	34 1	319	262	35.0	324	271	35 3	290	230	33.1	310	253	34.4	322	273	35.2	328	283	35.5
110	78	278	215	33 8	301	240	35 4	316	261	36 4	–	–	–	283	227	34 1	305	251	35.7	319	272	36.6	–	–	–
115	75	271	212	34 7	290	246	36 1	306	280	37 3	312	295	37 8	275	224	35 1	293	257	36 4	309	292	37 6	315	307	38 0

OUTDOOR AIR TEMP		TOTAL UNIT CFM 11,000												12,000									
		Outdoor Air Cfm 0			1000			2000			2500			0			1000			2000			2500	
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	325	254	29 1	336	268	29 7	343	279	30 1	345	285	30 2	329	264	29 3	340	279	29 9	347	290	30 3	349	295	30 4
	70	325	254	29 1	341	262	30 0	352	268	30 5	355	270	30 7	329	264	29 3	345	273	30 2	355	279	30 7	359	281	30 9
90	65	318	251	30 2	328	270	30 8	335	287	31 1	342	299	31 5	322	261	30 4	332	281	31 0	339	297	31 3	346	310	31 7
	70	318	251	30 2	334	264	31 1	343	275	31 6	347	280	31 8	322	261	30 4	337	275	31 3	347	286	31 8	350	291	32 0
	73	318	251	30 2	337	261	31 3	349	268	31 9	354	271	32 1	322	261	30 4	341	272	31 4	352	279	32 0	357	282	32 3
	75	318	251	30.2	339	258	31 4	353	262	32 1	358	264	32 4	322	261	30 4	343	269	31 6	355	273	32.2	361	275	32 5
95	65	310	247	31 3	324	275	32 1	332	298	32 5	335	308	32 7	314	258	31 5	328	286	32 3	336	309	32 8	338	319	32 9
	70	310	247	31.3	325	267	32 2	334	282	32 7	338	290	32 9	314	258	31 5	329	277	32 4	338	293	32 9	341	301	33 1
	75	310	247	31 3	331	260	32 5	344	270	33 2	349	274	33 5	314	258	31 5	334	271	32 7	347	280	33 4	351	285	33.6
	78	310	247	31 3	334	256	32 7	350	262	33 5	–	–	–	314	258	31 5	337	267	32 9	352	272	33 7	–	–	–
	80	310	247	31 3	337	253	32 8	354	256	33 8	–	–	–	314	258	31 5	340	264	33 0	–	–	–	–	–	–
100	70	302	244	32 4	317	268	33 2	326	290	33 8	334	304	34 3	306	255	32 6	320	279	33 5	329	300	34 0	337	315	34 4
	75	302	244	32 4	322	262	33 6	335	277	34 3	340	284	34.6	306	255	32 6	325	273	33 8	337	288	34 5	342	295	34 8
	78	302	244	32 4	325	258	33 8	340	269	34 7	–	–	–	306	255	32 6	328	269	34 0	–	–	–	–	–	–
105	70	294	241	33 4	308	270	34 3	322	301	35 2	326	313	35 4	298	251	33 6	311	281	34 5	325	312	35 4	329	324	35 6
	75	294	241	33.4	313	264	34.6	325	284	35.4	330	294	35 7	298	251	33 6	316	275	34 8	328	295	35 6	–	–	–
110	78	287	238	34 4	308	262	35 9	–	–	–	–	–	–	290	248	34 6	311	273	36 1	–	–	–	–	–	–
115	75	279	234	35 4	296	268	36 6	312	303	37 8	–	–	–	282	245	35 6	299	279	36 8	–	–	–	–	–	–

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

Room Design 78 F/50% Rh

COOLING CAPACITIES

48MA/50ME034

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		10,000 Outdoor Air Cfm												11,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	333	246	29 6	343	260	30 1	349	271	30 3	350	276	30 4	338	258	29 8	348	271	30 3	353	282	30 6	355	287	30 7
	70	333	246	29.6	349	254	30.4	357	260	30.8	361	262	31.0	338	258	29 8	353	266	30.6	362	271	31.0	365	273	31.2
90	65	326	243	30 7	335	262	31 2	340	278	31 4	347	290	31 8	331	255	30 9	340	273	31 4	349	293	31 9	351	301	32 0
	70	326	243	30 7	341	257	31 5	349	267	31 9	352	272	32 1	331	255	30 9	345	268	31.7	353	279	32 1	356	283	32 3
	73	326	243	30 7	344	253	31 6	355	260	32 2	359	263	32 4	331	255	30 9	349	265	31 9	359	271	32 4	363	274	32 6
	75	326	243	30.7	346	251	31.8	359	255	32.4	364	256	32.7	331	255	30.9	351	262	32.0	363	266	32.6	367	268	32.8
95	65	319	240	31 8	331	267	32 5	337	289	32.9	340	299	33 0	323	252	32 1	336	278	32 7	342	301	33 1	345	311	33 2
	70	319	240	31 8	333	259	32 6	341	274	33 0	344	282	33 2	323	252	32 1	337	270	32 8	345	286	33 2	347	293	33 4
	75	319	240	31 8	338	253	32 9	350	262	33 5	354	266	33 8	323	252	32 1	342	264	33 1	353	273	33 7	358	278	34 0
	78	319	240	31 8	342	249	33 1	356	254	33 9	362	256	34 2	323	252	32 1	346	260	33 3	359	266	34 1	365	268	34 4
	80	319	240	31.8	344	246	33.2	360	249	34.1	367	250	34.5	323	252	32.1	348	258	33.4	363	260	34.3	370	261	34.6
100	70	311	237	32 9	324	261	33 7	331	282	34 1	339	296	34 6	315	248	33 2	328	272	33 9	335	293	34 4	343	307	34 8
	75	311	237	32 9	329	255	34 0	341	269	34 7	345	276	34 9	315	248	33 2	333	266	34 2	344	281	34.9	348	288	35 1
	78	311	237	32.9	333	251	34.2	347	261	35.0	352	266	35.4	315	248	33.2	336	262	34.4	350	273	35.2	355	278	35.5
105	70	303	234	34 0	315	263	34 8	328	293	35 6	331	305	35 8	307	245	34 2	322	277	35 2	331	304	35 8	335	316	36 0
	75	303	234	34.0	321	257	35.1	331	277	35.8	335	286	36.1	307	245	34.2	324	268	35.3	334	288	36.0	339	297	36.3
110	78	295	231	35.0	315	255	36.4	328	276	37.2	333	286	37.6	299	242	35.3	319	266	36.6	330	287	37.4	–	–	–
115	75	287	228	36 0	304	261	37 1	318	295	38 2	323	310	38 6	291	239	36 3	307	272	37 4	321	307	38 4	325	321	38 8

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		12,000 Outdoor Air Cfm												13,000 Outdoor Air Cfm											
		0			1000			2000			2500			0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	343	269	30 1	352	282	30 5	357	293	30 8	359	298	30 9	346	280	30 2	356	293	30 7	361	304	31 0	363	309	31 1
	70	343	269	30.1	358	277	30.8	366	282	31.2	369	284	31.4	346	280	30.2	361	288	31.0	369	293	31.4	372	295	31.5
90	65	335	266	31 2	344	284	31 6	354	305	32 1	356	312	32 3	339	277	31 3	347	295	31 8	357	316	32 3	359	323	32 4
	70	335	266	31 2	349	279	31 9	357	290	32 3	360	294	32 5	339	277	31 3	352	290	32 1	360	300	32 5	363	305	32 6
	73	335	266	31 2	352	276	32 1	362	282	32 6	366	285	32 8	339	277	31 3	355	286	32 2	365	293	32 7	369	296	32 9
	75	335	266	31.2	354	273	32.2	366	278	32.8	370	279	33.0	339	277	31.3	357	284	32.3	368	288	32.9	373	290	33.1
95	65	327	263	32 3	339	289	33 0	346	312	33 3	348	322	33 5	331	273	32 5	343	300	33 2	349	323	33 5	352	333	33 7
	70	327	263	32 3	340	281	33 0	348	297	33 4	350	304	33 6	331	273	32 5	344	292	33 2	351	308	33 6	354	315	33 8
	75	327	263	32 3	345	275	33 3	356	285	33 9	361	289	34 1	331	273	32 5	349	286	33 5	359	295	34 1	363	300	34 3
	78	327	263	32 3	349	271	33 5	362	277	34 2	367	279	34 5	331	273	32 5	352	282	33 6	364	288	34 3	–	–	–
	80	327	263	32.3	351	269	33.6	366	271	34.4	–	–	–	331	273	32.5	354	279	33.8	368	282	34.5	–	–	–
100	70	319	259	33 4	332	283	34 1	343	308	34 8	346	318	35 0	322	270	33 6	334	294	34 3	346	319	35 0	349	329	35 2
	75	319	259	33 4	336	277	34 4	347	292	35 0	351	299	35 3	322	270	33 6	339	288	34 6	349	303	35 2	353	310	35 4
	78	319	259	33.4	339	273	34.6	352	284	35.4	357	289	35.7	322	270	33.6	342	284	34.8	354	295	35.5	–	–	–
105	70	311	256	34 5	326	288	35 4	335	315	36 0	338	328	36 2	314	267	34 7	329	299	35 6	337	326	36 2	341	338	36 4
	75	311	256	34.5	327	279	35.5	337	299	36.2	341	309	36.4	314	267	34.7	330	290	35 7	340	310	36.3	343	319	36 5
110	78	302	253	35.5	321	277	36.8	333	298	37.6	–	–	–	305	264	35.7	323	288	37.0	–	–	–	–	–	–
115	75	295	250	36 5	310	283	37 6	323	318	38 6	328	328	38 9	297	260	36 7	312	294	37.8	325	325	38 8	–	–	–

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1. No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

COOLING CAPACITIES

48MA/50ME034

Room Design 80 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 10,000 — Outdoor Air Cfm: 0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	343	247	30 1	352	260	30 5	356	271	30 9	358	281	30 8
	70	343	247	30.1	357	255	30.8	365	260	31.2	370	264	31.4
90	65	336	244	31 2	344	262	31 6	352	282	32 1	355	297	32 2
	70	336	244	31 2	349	257	31 9	357	268	32 3	361	277	32 5
	73	336	244	31 2	352	254	32 1	362	26'	32 6	369	266	32 9
	75	336	244	31.2	355	252	32.2	366	256	32.8	374	259	33.2
95	65	328	241	32 3	339	267	32 9	345	289	33 3	348	309	33 4
	70	328	241	32 3	341	259	33 0	348	275	33 4	352	290	33 7
	75	328	241	32 3	346	254	33 3	357	263	33 9	365	272	34 4
	78	328	241	32 3	350	250	33 5	363	255	34 3	373	260	34 8
	80	328	241	32.3	352	247	33.7	367	250	34.5	378	252	35.1
100	70	320	238	33 5	332	261	34 2	342	286	34 8	348	305	35 '
	75	320	238	33 5	337	256	34 5	348	270	35 1	355	284	35 5
	78	320	238	33.5	341	252	34.7	353	263	35.4	363	273	36.0
105	70	312	235	34 6	326	266	35 5	335	293	36 0	340	318	36 4
	75	312	235	34.6	328	258	35.6	338	278	36.2	345	297	36.7
110	78	304	232	35.6	323	256	36.9	334	777	37.7	343	298	38.3
115	75	296	229	36 6	311	262	37 7	325	296	38 7	332	325	39 3

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 11,000 — Outdoor Air Cfm: 0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	349	259	30 4	357	272	30 8	361	283	31 0	363	292	31 1
	70	349	259	30.4	362	267	31.0	369	272	31.4	374	276	31.6
90	65	341	256	31 5	349	274	31 0	357	294	32 3	360	309	32 5
	70	341	256	31 5	354	269	32 1	361	279	32 5	365	289	32 8
	73	341	256	31 5	357	266	32 3	366	272	32 8	372	278	33 1
	75	341	256	31.5	359	263	32.4	370	267	33.0	377	271	33.4
95	65	333	253	32 6	344	279	33 2	350	301	33 5	353	321	33 7
	70	333	253	32 6	345	271	33 3	352	287	33 7	356	301	33 9
	75	333	253	32 6	350	265	33 6	360	275	34 1	368	283	34 6
	78	333	253	32 6	354	261	33 8	366	267	34 4	376	272	35 0
	80	333	253	32.6	356	259	33.9	370	261	34.7	381	264	35.3
100	70	325	250	33 7	336	273	34 4	347	298	35 0	352	317	35 4
	75	325	250	33 7	341	267	34 7	351	282	35 3	358	296	35 7
	78	325	250	33 7	345	263	34 9	356	274	35 6	365	284	36 2
105	70	317	246	34 8	330	278	35 7	338	305	36 2	344	329	36 6
	75	317	246	34.8	332	269	35.8	341	289	36 4	348	308	36.9
110	78	308	243	35.9	326	268	37.1	337	289	37.9	345	309	38.4
115	75	300	240	36 9	314	273	37 9	327	308	38 9	335	335	39 5

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 12,000 — Outdoor Air Cfm: 0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	353	270	30 6	361	283	31 0	365	294	31 2	367	304	31 3
	70	353	270	30 6	366	278	31 2	373	283	31 6	378	287	31 8
90	65	345	267	31 7	353	285	32 1	361	305	32 5	365	320	32 7
	70	345	267	31 7	358	280	32 3	365	291	32 7	369	300	32 9
	73	345	267	31 7	361	277	32 5	370	283	33 0	376	289	33 3
	75	345	267	31 7	363	274	32 6	373	279	33 2	381	282	33 5
95	65	337	264	32 8	348	290	33 4	354	312	33 8	357	332	33 9
	70	337	264	32 8	349	282	33 5	355	298	33 9	359	312	34 1
	75	337	264	32 8	354	276	33 8	363	286	34 3	371	295	34 7
	78	337	264	32 8	357	272	34 0	369	278	34 6	378	283	35 1
	80	337	264	32 8	359	270	34 1	373	273	34 8	–	–	–
100	70	329	261	34 0	340	284	34 6	350	309	35 2	356	328	35 6
	75	329	261	34 0	345	278	34 9	354	293	35 5	361	307	35 9
	78	329	261	34 0	348	274	35 1	359	285	35 8	368	295	36 3
105	70	320	257	35 1	334	289	35 9	342	316	36 5	347	340	36 8
	75	320	257	35 1	335	280	36 0	344	300	36 6	350	319	37 0
110	78	312	254	36 1	329	278	37 3	339	300	38 0	–	–	–
115	75	304	251	37 2	317	284	38 1	330	319	39 1	337	337	39 6

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 13,000 — Outdoor Air Cfm: 0			1000			2000			2500		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	357	281	30 8	365	294	31 2	369	305	31 4	370	310	31 4
	70	357	281	30 8	370	289	31 4	377	294	31 7	379	296	31 9
90	65	349	278	31 9	356	296	32 3	365	316	32 7	367	324	32 8
	70	349	278	31 9	361	291	32 5	368	302	32 9	370	306	33 0
	73	349	278	31 9	364	287	32 7	373	295	33 1	376	298	33 3
	75	349	278	31.9	366	285	32 8	376	290	33 3	380	291	33 5
95	65	340	275	33 0	352	301	33 6	357	323	34 0	359	333	34 1
	70	340	275	33 0	352	293	33 7	358	309	34 0	360	316	34 1
	75	340	275	33 0	357	287	33 9	366	297	34 5	370	301	34 7
	78	340	275	33 0	360	283	34 1	371	289	34 7	376	292	35 0
	80	340	275	33 0	362	281	34 2	375	283	34 9	–	–	–
100	70	332	271	34 2	343	295	34 8	353	320	35 4	356	330	35 6
	75	332	271	34 2	347	289	35 1	356	304	35.6	360	311	35 8
	78	332	271	34 2	350	285	35.3	361	296	35 9	365	302	35 2
105	70	323	268	35 3	337	300	36 1	345	327	36 6	348	339	36 8
	75	323	268	35 3	338	291	36 2	346	311	36 7	350	321	37 0
110	78	315	265	36 4	332	289	37 5	341	311	38 2	–	–	–
115	75	306	262	37 4	319	295	38 3	332	333	39 3	336	336	39 5

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1. No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

PERFORMANCE DATA

Room Design 75 F/50% Rh

COOLING CAPACITIES

48MA/50ME040

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		11,000 Outdoor Air Cfm												12,000 Outdoor Air Cfm											
		0			1000			2000			3000			0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	367	262	36 8	402	294	39 0	416	311	40 2	420	322	40 8	368	268	36 8	406	302	39 1	423	323	40 4	427	335	41 0
	70	367	262	36.8	410	290	39.5	426	300	40.8	434	305	41.6	368	268	36 8	414	300	39 7	432	312	41 0	441	318	41 9
90	65	364	263	38 3	394	297	40 4	403	316	41 6	404	330	42 3	366	270	38 4	399	307	40 6	410	328	41 8	411	343	42 5
	70	364	263	38 3	401	293	40 9	412	304	42 3	418	314	43 1	366	270	38 4	406	303	41 1	418	317	42 5	425	326	43 3
	73	364	263	38 3	408	291	41 4	419	298	42 8	427	303	43 7	366	270	38 4	413	303	41 7	426	310	43 0	434	315	43 9
	75	364	263	38.3	413	290	41 5	425	293	43 1	434	295	44 1	366	270	38 4	419	302	41 8	431	305	43 4	440	308	44 2
95	65	361	264	39 8	386	300	41 8	390	321	43 1	388	339	43 8	364	272	39 9	392	312	42 0	397	334	43 3	398	351	44 1
	70	361	264	39 8	392	295	42 3	398	309	43 8	402	323	44 6	364	272	39 9	398	307	42 6	404	322	44 0	409	335	44 8
	75	361	264	39 8	398	289	43 1	408	296	44 6	416	304	45 6	364	272	39 9	404	301	43 3	414	308	44 9	423	316	45 8
	78	361	264	39 8	402	285	43 4	413	287	45 2	427	292	46 3	364	272	39 9	408	297	43 8	419	299	45 4	433	305	46 4
	80	361	264	39 8	405	282	43 6	418	281	45 6	433	284	46 7	364	272	39 9	411	294	43 8	423	293	45 8	438	296	46 9
100	70	355	264	41 3	397	294	43 9	381	313	45 4	384	331	46 3	359	273	41 5	384	306	44 2	387	325	45 6	390	342	46 5
	75	355	264	41 3	383	288	44 6	390	300	46 2	399	313	47 2	359	273	41 5	389	300	44 8	396	311	46 5	404	325	47 4
	78	355	264	41 3	387	284	44 9	397	291	46 7	410	302	47 8	359	273	41 5	393	296	45.1	402	303	47 0	414	313	48.0
105	70	351	263	42 8	365	294	45 5	364	316	46 9	366	338	48 0	354	271	43 0	371	306	45 7	370	327	47 1	371	349	48 3
	75	351	263	42.8	368	287	46.1	373	303	47.8	381	322	48.8	354	271	43.0	374	299	46.3	378	314	48.0	385	333	49 0
110	78	342	260	44.3	354	280	48.2	360	298	50.1	373	319	51 4	347	269	44 6	359	291	48 4	366	309	50 3	376	330	51 5
115	75	334	257	45 8	336	283	49 4	338	309	51 3	347	336	52 9	339	269	46 1	342	295	49 7	343	320	51 6	353	347	53 1

OUTDOOR AIR TEMP		TOTAL UNIT CFM																							
		13,000 Outdoor Air Cfm												14,000 Outdoor Air Cfm											
		0			1000			2000			3000			0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	371	273	36 9	409	310	39 2	426	333	40 5	432	345	41 1	374	279	37 1	412	318	39 4	429	342	40 6	438	356	41 3
	70	371	273	36.9	417	307	39.8	437	322	41.2	446	329	42.0	374	279	37.1	420	315	39.9	442	333	41.4	451	340	42.2
90	65	369	276	38 5	402	315	40 7	415	339	42 0	417	354	42.7	371	282	38 6	405	323	40 8	419	349	42 1	422	364	42 8
	70	369	276	38 5	409	312	41 2	423	328	42 6	430	338	43 5	371	282	38 6	412	321	41 4	429	339	42 8	435	349	43 6
	73	369	276	38 5	416	311	41 7	431	321	43 2	439	327	44 0	371	282	38 6	419	320	41 8	439	332	43 3	443	338	44 2
	75	369	276	38.5	423	312	41.8	436	316	43.4	445	319	44.3	371	282	38.6	427	322	41.9	440	328	43.5	449	330	44.5
95	65	367	279	40 0	395	320	42 1	403	345	43 4	401	362	44 2	369	286	40 1	397	328	42 2	409	356	43 5	409	373	44 4
	70	367	279	40 0	401	316	42 7	410	333	44 1	414	347	45 0	369	286	40 1	405	326	42 9	416	345	44 2	418	358	45 1
	75	367	279	40 0	408	311	43 4	418	319	45 0	427	328	46 0	369	286	40.1	412	321	43 5	422	330	45 2	431	339	46 1
	78	367	279	40 0	412	307	43 7	423	310	45 5	436	315	46 6	369	286	40 1	416	317	43 8	428	321	45 7	438	326	46 7
	80	367	279	40.0	415	304	44.0	427	304	45.9	442	307	47.0	369	286	40.1	419	315	44.1	431	315	46.0	445	317	47.1
100	70	362	280	41 6	388	317	44 3	393	336	45 7	395	353	46 7	364	287	41 7	393	327	44 5	398	347	45 9	400	364	46 9
	75	362	280	41 6	394	310	45 0	400	322	46 6	408	336	47 6	364	287	41 7	398	321	45 1	405	333	46 8	413	347	47 7
	78	362	280	41.6	397	307	45.3	406	314	47.1	417	324	48.2	364	287	41.7	402	318	45.4	410	325	47.2	420	334	48.3
105	70	357	281	43 1	376	317	45 9	375	338	47 3	376	359	48 4	359	289	43 2	380	328	46 1	380	349	47 5	382	369	48 6
	75	357	281	43.1	379	310	46.5	383	325	48.2	390	344	49.2	359	289	43.2	384	321	46.7	388	335	48.4	395	355	49.3
110	78	349	279	44.7	364	302	48 6	371	320	50.5	380	341	51.7	352	288	44.8	368	313	48 8	377	330	50.7	385	351	51.8
115	75	342	278	46 3	347	305	49 9	350	331	51 7	359	354	53 3	345	287	46 4	352	316	50 1	357	343	51 8	365	362	53 6

Kw — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

COOLING CAPACITIES

48MA/50ME040

Room Design 78 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM																					
		11,000												12,000									
		Outdoor Air Cfm												Outdoor Air Cfm									
		0			1000			2000			3000			0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	372	262	37 9	410	298	39 3	425	318	40 4	431	329	41 1	375	268	37 0	414	307	39 5	431	329	40 7	438	342	41 3
	70	372	262	37.9	417	295	39.8	438	307	41.2	445	312	41.9	375	268	37.0	421	304	39.9	443	320	41.4	452	325	42.1
90	65	371	266	38 5	403	302	40 8	415	324	41 9	417	339	42 6	374	273	38 7	407	312	40 9	421	337	42 2	424	352	42 9
	70	371	266	38 5	411	299	41 3	426	314	42 7	431	323	43 4	374	273	38 7	415	310	41 5	432	327	42 9	437	336	43 6
	73	371	266	38 5	417	298	41 7	433	307	43 2	441	313	44 0	374	273	38 7	422	308	41 9	439	320	43 4	448	326	44 2
	75	371	266	38.5	423	298	41.8	439	303	43.5	448	305	44.4	374	273	38.7	429	306	42.1	445	316	43.8	455	319	44.6
95	65	370	269	40 2	396	306	42.2	405	331	43 4	402	348	44 2	374	277	40 4	400	317	42 4	411	344	43 6	411	361	44 5
	70	370	269	40 2	404	303	42 8	414	320	44 2	416	333	44 9	374	277	40 4	409	315	43 1	420	334	44 4	423	346	45 2
	75	370	269	40 2	411	298	43 4	423	307	45 1	431	315	46 0	374	277	40 4	417	310	43 7	429	320	45 3	438	328	46 2
	78	370	269	40 2	416	295	43 8	429	299	45 6	442	306	46 7	374	277	40 4	421	307	44 0	435	311	45 9	447	316	46 9
	80	370	269	40.2	420	292	44.0	434	293	46.0	448	295	47.2	374	277	40.4	424	304	44.3	439	306	46.2	454	308	47.3
100	70	364	269	41 7	393	304	44 4	398	324	45 8	398	340	46 7	368	277	41 9	398	317	44 6	404	337	46.0	404	353	47 0
	75	364	269	41 7	399	299	45 0	407	311	46 7	414	324	47 7	368	277	41 9	405	311	45 2	414	325	46 9	420	337	47 9
	78	364	269	41.7	404	295	45.4	412	303	47.2	425	312	48.3	368	277	41.9	410	308	45.6	417	315	47.5	429	325	48.5
105	70	359	268	43 2	383	306	46 0	381	328	47 4	381	347	48 5	362	278	43 4	388	319	46 2	388	341	47 7	387	360	48 7
	75	359	268	43.2	386	299	46.6	391	315	48.3	397	333	49.3	362	278	43.4	393	312	46 8	399	329	48 4	402	345	49 5
110	78	352	267	44.8	372	293	48.8	379	311	50 6	387	330	51 9	355	277	45 0	378	306	49 0	385	324	50 8	392	342	52 1
115	75	345	265	46 4	358	298	49 9	356	322	51 9	363	347	53 4	348	275	46 6	363	311	50 2	363	334	52 1	369	358	53 6

OUTDOOR AIR TEMP		TOTAL UNIT CFM																					
		13,000												14,000									
		Outdoor Air Cfm												Outdoor Air Cfm									
		0			1000			2000			3000			0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	378	276	37 2	416	314	39 5	434	337	40 8	442	352	41 4	382	283	37 4	418	321	39 6	437	346	40 9	445	363	41.5
	70	378	276	37.2	424	312	40.0	446	328	41.5	456	336	42.2	382	283	37.4	428	319	40.2	449	337	41.6	459	347	42.4
90	65	377	280	38 8	409	320	41 0	425	346	42 3	429	363	43 1	379	287	39 0	412	327	41 1	429	356	42 4	434	374	43 2
	70	377	280	38 8	418	318	41 6	436	336	43 0	442	347	43 8	379	287	39 0	421	326	41 7	439	346	43 1	448	359	43 9
	73	377	280	38 8	424	317	42 0	444	331	43 6	453	338	44 4	379	287	39 0	427	325	42 1	448	342	43.7	457	349	44.5
	75	377	280	38.8	431	317	42.2	450	328	43.9	460	331	44.7	379	287	39.0	434	326	42.4	454	339	44.0	465	344	44.8
95	65	375	284	40 4	403	325	42 5	416	355	43 8	417	373	44 7	377	291	40 5	405	334	42 6	420	365	43 9	424	385	44 8
	70	375	284	40 4	411	323	43 2	425	345	44 5	429	359	45 3	377	291	40 5	414	332	43 3	429	356	44 7	436	371	45 5
	75	375	284	40 4	420	319	43 8	434	332	45 4	442	340	46 4	377	291	40 5	423	328	43 9	439	344	45.6	447	352	46 5
	78	375	284	40 4	423	316	44 1	439	323	46 0	451	327	47 0	377	291	40 5	426	324	44 2	444	336	46 1	454	339	47 2
	80	375	284	40.4	427	314	44.4	443	318	46.3	457	319	47.5	377	291	40.5	430	323	44.5	448	330	46.4	459	331	47.6
100	70	370	285	42 0	402	326	44 8	409	348	46 2	411	365	47 1	372	292	42 1	406	336	44 9	414	360	46 4	417	377	47 3
	75	370	285	42 0	408	321	45 4	419	336	47 0	424	348	48 0	372	292	42 1	412	331	45 5	423	348	47 2	429	360	48 1
	78	370	285	42.0	413	319	45.7	423	328	47.5	432	336	48.7	372	292	42.1	417	329	45.9	429	340	47.6	435	348	48.8
105	70	364	285	43 5	392	330	46 3	393	352	47 8	394	371	48 9	367	293	43 6	397	340	46 5	398	364	48 0	399	382	49 1
	75	364	285	43.5	397	323	46.9	403	341	48.6	407	357	49.6	367	293	43.6	401	334	47.1	407	352	48.8	411	369	49.8
110	78	358	285	45.1	384	318	49.2	389	334	51.1	397	353	52.2	361	293	45.3	389	329	49.3	393	345	51.3	402	364	52.4
115	75	351	285	46 7	368	322	50 4	368	345	52 3	375	368	53 9	354	294	46 9	373	333	50 5	374	357	52 5	381	377	54 1

Kw — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

Room Design 80 F/50% Rh

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 11,000 — Outdoor Air Cfm: 0			1000			2000			3000			12,000 — 0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	378	256	37.1	417	292	39 5	434	314	40 8	440	327	41 3	381	263	37 4	421	300	39 7	438	324	41 0	445	338	41 5
	70	378	256	37.1	424	288	40.0	446	304	41.5	456	312	42.3	381	263	37.4	427	296	40.1	45[illegible]	314	41.7	462	324	42.5
90	65	377	259	38 8	411	297	41 1	425	322	42 3	429	338	43 0	380	266	39 0	415	305	41 2	431	334	42 5	436	351	43 1
	70	377	259	38 8	419	293	41 6	436	312	43 0	444	323	43 8	380	266	39 0	422	302	41 7	442	323	43 2	450	336	44 0
	73	377	259	38 8	425	292	42 0	445	306	43 5	454	313	44 4	380	266	39.0	429	302	42 1	449	319	43 7	460	326	44 6
	75	377	259	38.8	431	292	42.2	453	303	43.9	460	306	44.8	380	266	39.0	433	302	42.3	459	317	44.0	469	320	45.0
95	65	376	262	40 5	405	302	42 6	416	330	43 8	418	350	44 6	379	269	40 6	409	311	42 8	423	343	44 1	428	364	44 8
	70	376	262	40 5	413	298	43 1	427	319	44 5	431	335	45 3	379	269	40 6	417	308	43 3	433	332	44 7	438	348	45 5
	75	376	262	40 5	421	295	43 8	438	308	45 5	444	316	46 5	379	269	40 6	425	305	44 0	444	322	45 7	452	330	46 7
	78	376	262	40 5	426	292	44 2	446	301	46 1	455	305	47 2	379	269	40 6	430	302	44 4	452	314	46 2	462	318	47 3
	80	376	262	40.5	429	290	44.4	450	295	46.3	463	297	47.6	379	269	40.6	434	300	44.6	456	308	46.5	468	310	47.8
100	70	372	263	42 1	404	301	44 7	413	325	46 2	414	343	47 1	375	270	42 3	408	312	44 9	419	338	46 4	421	356	47 4
	75	372	263	42 1	412	297	45 4	423	313	47 1	429	326	48 1	375	270	42 3	416	309	45 6	429	327	47 4	435	339	48 3
	78	372	263	42.1	418	295	45.9	431	306	47.6	438	315	48.8	375	270	42.3	424	307	46.2	437	319	47.8	444	328	49.0
105	70	368	263	43 7	395	304	46 3	399	331	47 9	399	352	48 9	371	272	43 9	399	316	46 4	406	344	48 1	406	364	49 2
	75	368	263	43.7	402	300	47.1	408	319	48.8	413	336	49.8	371	272	43.9	407	312	47.3	414	332	49.0	418	349	50.0
110	78	361	262	45.3	394	297	49.3	399	315	51.1	406	335	52.3	365	271	45.5	399	310	49.5	404	328	51.4	410	347	52.5
115	75	354	261	46.9	377	301	50 5	376	327	52 4	377	351	53 9	358	270	47 1	384	314	50 7	384	340	52 7	384	363	54 1

OUTDOOR AIR TEMP		TOTAL UNIT CFM: 13,000 — Outdoor Air Cfm: 0			1000			2000			3000			14,000 — 0			1000			2000			3000		
Db	Wb	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw	TC	SHC	Kw
85	65	384	268	37 5	422	305	39 7	441	332	41 1	448	347	41 6	387	278	37 6	422	311	39 7	444	340	41 2	452	356	41 7
	70	384	268	37.5	431	304	40.3	454	323	41.8	465	333	42.6	387	278	37.6	435	310	40.5	457	331	41.9	468	342	42.7
90	65	382	271	39 0	417	312	41 3	434	342	42 7	440	360	43 3	383	275	39 0	418	320	41 3	437	351	42 8	444	370	43 4
	70	382	271	39 0	425	311	41 9	445	332	43 3	454	346	44 1	383	275	39 0	429	320	42 1	448	342	43 4	458	356	44 2
	73	382	271	39.0	432	310	42 3	453	328	43 8	464	337	44 7	383	275	39 0	435	320	42 5	456	337	43 9	467	348	44 9
	75	382	271	39.0	436	309	42.4	462	326	44.1	474	332	45.1	383	275	39.0	439	316	42.5	464	336	44.2	478	344	45.2
95	65	380	274	40 6	412	318	42 9	427	352	44 3	432	374	45 0	380	278	40 5	414	327	42 9	430	362	44 4	437	385	45 1
	70	380	274	40 6	420	317	43 5	436	342	44 8	443	359	45 7	380	278	40 5	423	326	43 7	440	352	45 0	448	370	45 8
	75	380	274	40 6	428	313	44 1	448	332	45 8	457	342	46 8	380	278	40 5	431	321	44 2	451	343	45 9	461	354	46 9
	78	380	274	40 6	433	311	44 5	455	325	46 3	466	330	47 4	380	278	40 5	437	320	44 7	458	335	46 4	470	342	47 5
	80	380	274	40.6	437	309	44.7	461	319	46.7	472	322	47.9	380	278	40.5	440	318	44.8	465	331	47.0	476	334	48.0
100	70	377	277	42 4	411	321	45 0	424	349	46 6	426	367	47 5	379	284	42 5	414	330	45 2	429	359	46 7	432	379	47 7
	75	377	277	42 4	419	317	45 7	433	338	47 5	440	351	48 5	379	284	42 5	422	326	45 9	438	349	47 6	444	363	48 6
	78	377	277	42.4	427	316	46.3	441	331	47.9	449	340	49.1	379	284	42.5	429	325	46.4	446	342	48.1	454	352	49.2
105	70	375	280	44 2	402	324	46 6	412	356	48 3	412	376	49 4	378	289	44 4	405	333	46 7	418	367	48 3	418	387	49 6
	75	375	280	44.2	410	322	47.4	419	344	49.2	423	361	50.2	378	289	44.4	413	331	47.5	425	355	49.3	428	373	50.3
110	78	368	279	45.7	403	321	49.6	408	339	51.5	415	359	52.6	371	287	45.9	408	332	49.7	413	351	51.7	419	370	52.7
115	75	360	278	47.2	389	325	50.9	389	352	52.8	390	374	54.3	363	286	47.4	394	337	51.0	394	363	52.9	396	385	54.5

Kw – Compressor Motor Power Input
SHC – Sensible Heat Capacity (1000 Btuh)
TC – Total Capacity (1000 Btuh)

NOTES: 1 No values are given where unit cannot maintain the assumed room design relative humidity since the moisture content of the air leaving the unit is higher than the assumed room moisture content
2 Ratings are gross and do not include fan motor heat deduction

FAN PERFORMANCE

The procedure for determining required fan speed (rpm) and shaft horsepower for a 48MA (or 50ME) unit is described below.

Since the various unit zones operate at different air quantities and different external resistances, it is necessary to identify the zone having the highest static pressure requirement for the supply duct and supply outlet.

Usually, the longest duct run to the last outlet, with the greatest number of offsets and elbows, has the greatest static pressure requirement. Assume that a duct friction analysis has been made and the cfm and static pressure are as follows:

Zone No	CFM	ESP (in wg)	No Modules	CFM/Module
1	720	6	1	720
2	1080	8	1	1080
3	1080	5	1	1080
4	2700	6	3	900
5	900	4	1	900
6	1080	4	1	1080
7	1440	5	2	720
Totals	9000		10	

The total unit cfm is 9000. Zones 4 and 7 have 3 and 2 modules, respectively, "ganged" together to comply with the limitation of 1200 cfm per module.

The cfm for zone 2 is 1080 with an ESP of .8 in. wg. This module appears to possess the highest friction loss. Therefore, the main fan static pressure is established at .8 in. wg ESP.

Enter Table 4 fan performance at 9000 cfm, .8 in. wg ESP and read: 1070 rpm and 5.7 bhp. The 028 indoor fan motor data shows the standard 10 hp motor with a maximum bhp of 11.5. Therefore, 5.7 bhp for this selection is satisfactory. Two pulley selections are available with the 028: Pulley A, shipped mounted; Pulley B, shipped in the blower compartment. Pulley A has a fixed pitch and at 1095 rpm is close enough to the required cfm and should be used. Pulley B at 1230 rpm allows selection of the unit at higher cfm's and static pressures. (See Table 1.)

Pulley Selection – In general, for start-up, the pulley producing an rpm higher than required but closest to the required speed should be used. If this results in excess air being delivered, a locally supplied pulley that produces lower air quantity should be used. Two pulley selections are provided with each motor and cover most application requirements.

Balancing Dampers – As in any multizone application, suitable balancing dampers should be provided in each zone duct run. Normally, a 2-bladed damper is preferred to a single blade. For the selection example, balancing dampers should be adjusted (by the installer) to give the desired airflow and static pressures in each module. Ready access to balancing dampers is a major consideration when designing a multizone system. In a T-bar ceiling, this is not a problem. In a plastered ceiling, an access door at the damper location is required.

Low Cfm, Long Run Zones – Small zones with long runs can cause problems in any multizone system. As the cfm decreases at a given duct velocity, the friction loss per 100 ft increases significantly. Also, seam and joint leakage in a small duct of long length can prevent delivery of required cfm at the outlet grille.

Long ducts with low cfm should be oversized to give lower velocities, lower friction rates and reduced leakage rates. Recognition of the characteristics of small ducts and proper design of such runs will avert potential problem areas.

In addition to the fan performance table, fan curves (Fig. 32, 33, 34) have been included for easier interpolation and fan selection at rpm's and static pressures not shown in the fan performance table.

Table 4 — Fan Performance

UNIT 48MA/ 50ME	CFM	EXTERNAL STATIC PRESSURE (in. wg)										
		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2
		Fan Rpm										
		Bhp										
016 and 024	5,000	–	705	760	820	900	955	1020	1070	1120	1170	1220
		–	–	–	–	–	3.0	3.5	4.0	4.4	4.9	5.5
	6,000	–	740	810	880	955	1020	1070	1130	1180	1225	1270
		–	–	–	3.1	3.6	4.1	4.6	5.1	5.6	6.2	6.8
	7,000	740	805	880	960	1020	1070	1130	1190	1235	1280	–
		–	3.2	3.8	4.2	4.7	5.2	5.8	6.2	7.0	7.7	–
	8,000	820	880	970	1020	1080	1145	1200	1250	1300	–	–
		3.9	4.4	5.0	5.6	6.1	6.7	7.3	8.0	8.7	–	–
	9,000	900	980	1040	1100	1160	1215	1265	–	–	–	–
		5.2	5.9	6.6	7.2	7.9	8.5	9.1	–	–	–	–
	9,600	960	1030	1090	1150	1205	1255	–	–	–	–	–
		6.4	7.1	7.8	8.3	8.9	9.5	–	–	–	–	–
028 and 030	7,000	–	–	–	945	995	1040	1090	1130	1180	1220	1260
		–	–	–	–	–	–	5.2	5.8	6.5	7.0	7.6
	8,000	–	–	950	1000	1050	1100	1150	1190	1230	1270	–
		–	–	–	–	5.0	5.7	6.2	6.9	7.5	8.4	–
	9,000	–	960	1015	1070	1120	1170	1210	1250	1295	–	–
		–	–	5.0	5.7	6.3	6.9	7.5	8.3	9.3	–	–
	10,000	980	1040	1090	1140	1180	1230	1280	–	–	–	–
		5.1	5.8	6.3	6.9	7.6	8.4	9.5	–	–	–	–
	11,000	1065	1115	1170	1210	1255	1300	–	–	–	–	–
		6.3	7.0	7.7	8.7	9.7	10.5	–	–	–	–	–
	12,000	1150	1200	1240	1290	–	–	–	–	–	–	–
		8.0	9.0	10.0	11.0	–	–	–	–	–	–	–
034 and 040	7,000	–	–	–	–	930	960	990	1030	1060	1100	1140
		–	–	–	–	–	–	–	–	–	–	–
	8,000	–	–	900	940	975	1010	1040	1070	1110	1155	1200
		–	–	–	–	–	–	–	–	–	–	–
	9,000	900	930	960	1000	1030	1070	1105	1145	1190	1220	1250
		–	–	–	–	–	–	–	–	9.9	10.8	11.8
	10,000	970	1000	1030	1070	1105	1145	1180	1210	1250	1280	1320
		–	–	–	–	–	9.8	10.5	11.2	12.1	13.0	14.0
	11,000	1045	1080	1115	1150	1180	1220	1250	1280	1320	1350	1380
		–	–	9.9	10.6	11.3	12.1	13.0	13.8	14.5	15.3	16.5
	12,000	1130	1160	1195	1230	1260	1295	1330	1360	1390	1420	1445
		11.2	11.9	12.6	13.2	14.0	14.7	15.3	16.2	17.3	18.2	19.0
	13,000	1210	1250	1280	1325	1350	1380	1400	1430	1460	1480	–
		14.0	14.5	15.2	16.0	17.0	17.8	18.5	19.2	20.1	21.0	–
	14,000	1315	1345	1370	1400	1435	1460	1485	–	–	–	–
		17.1	18.1	18.8	19.5	20.3	21.0	21.8	–	–	–	–

NOTES:

1. *Italics* indicate higher horsepower motor is required. Units 016 and 024 are shown in the same table. *Underlined italicized values* apply to 024 only. Units 016 and 024 may use 10-hp 215T (NEMA frame size) motor. A larger motor may not be installed in units 028 and 030. Optional 20-hp motor for units 034 and 040 has 256T frame. Motor drives on units 024, 028 and 030 are interchangeable to permit fan operation above or below standard fan speeds.
2. Maximum fan motor bhp is based on conditions of minimum voltage and 80 F air across motor.
3. Fan performance has deductions for unit casing, wet coils, heaters and clean filters.
4. Cfm range per module is 600 to 1200 cfm. Lower flow volumes are permissible if only first stage of heat is operated. Volumes above 1200 cfm may cause water blow-off during cooling.

INDOOR AIR FAN MOTOR DATA

UNIT 48MA/ 50ME	MOTOR MAX BHP		FAN SPEED (Rpm)			
			Std Motor		Opt Motor	
	Std	Opt	Pulley A	Pulley B	Pulley A	Pulley B
016	5.75	*	880	995	–	–
024	8 60	*	995	1145	–	–
028	11 50	–	1095	1230	–	–
030	11 50	–	1095	1230	–	–
034	17.25	22.8	1095	1230	1320	1425
040	17.25	22 2	1095	1230	1320	1425

*Field Supplied

FAN PERFORMANCE

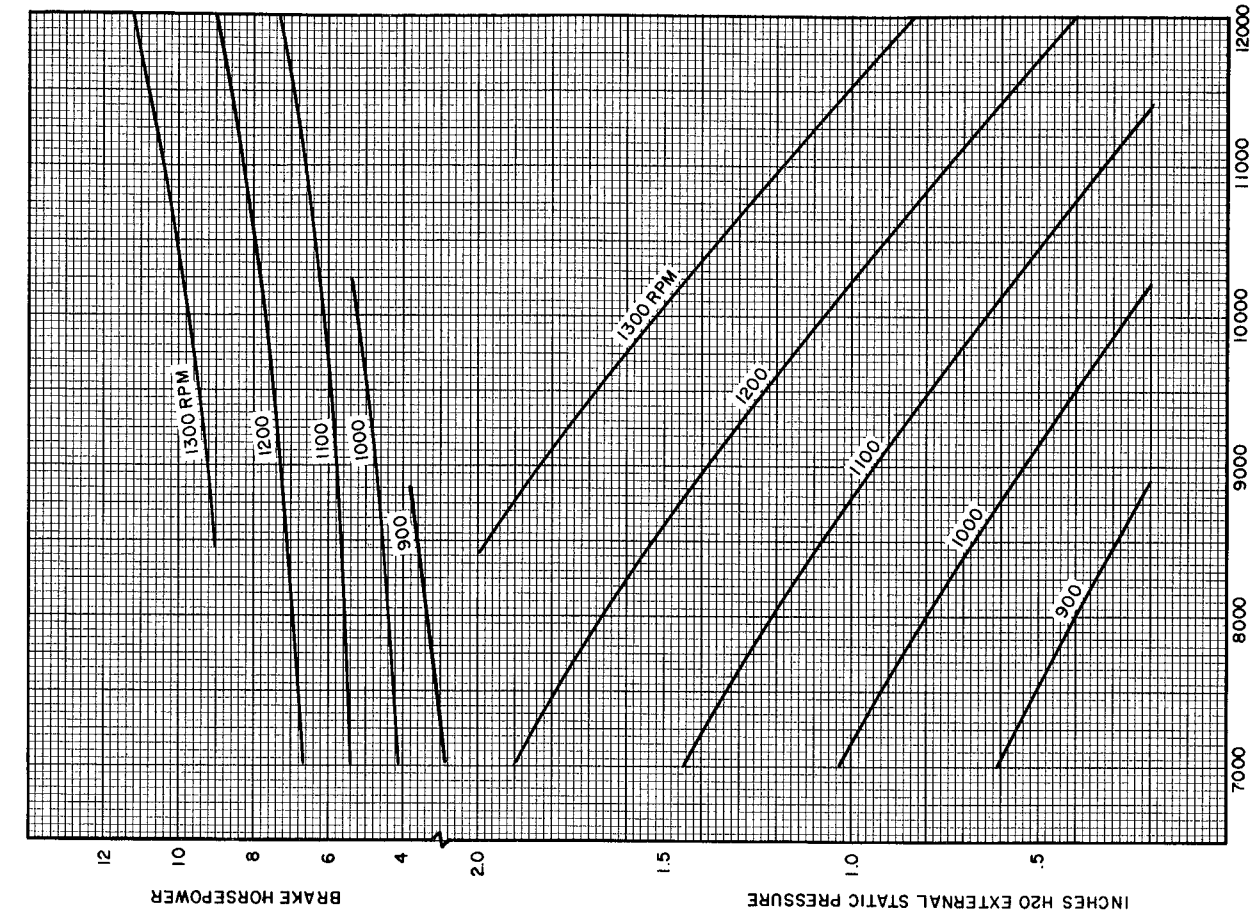


Fig. 33 — Fan Performance, 48MA/50ME028,030

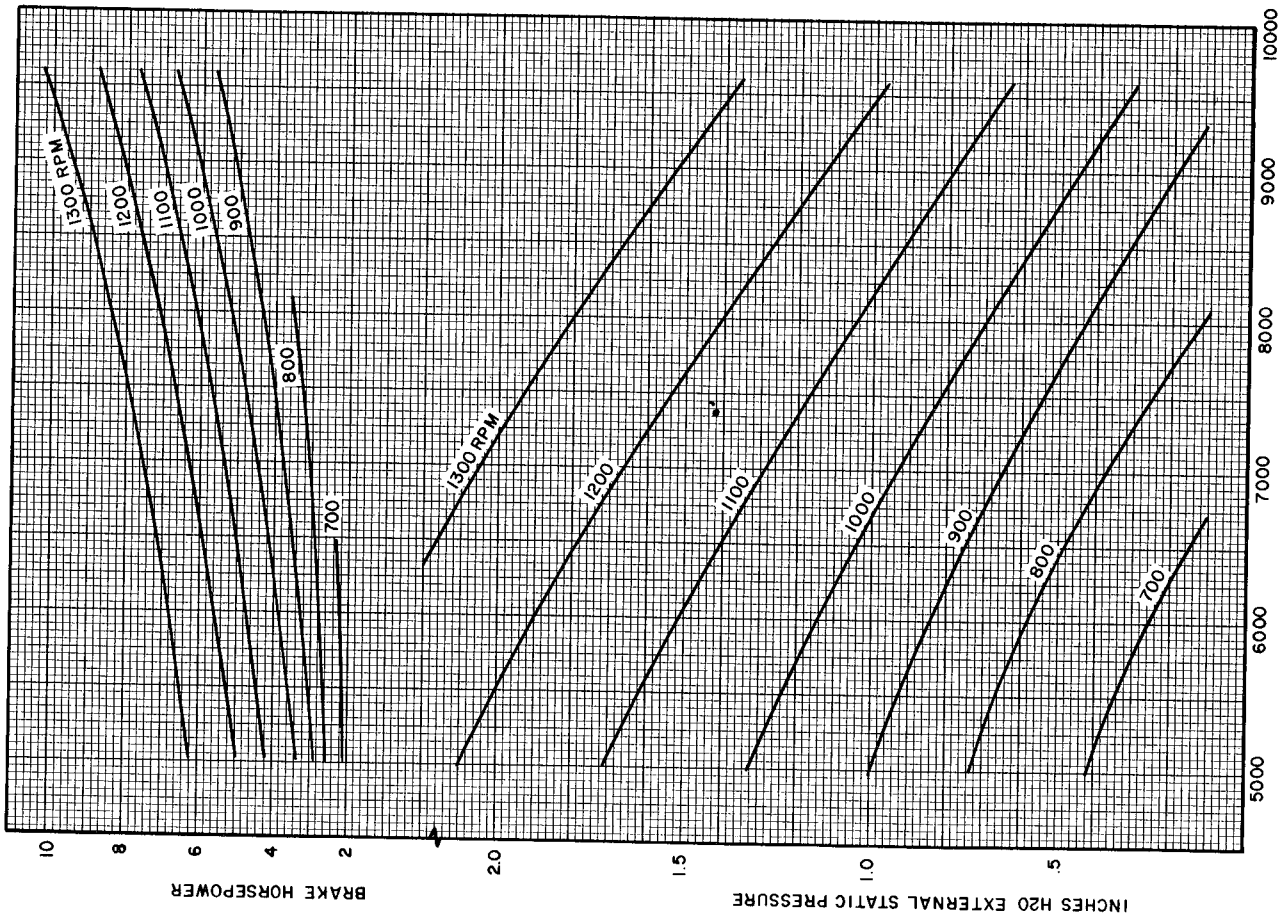


Fig. 32 — Fan Performance, 48MA/50ME016,024

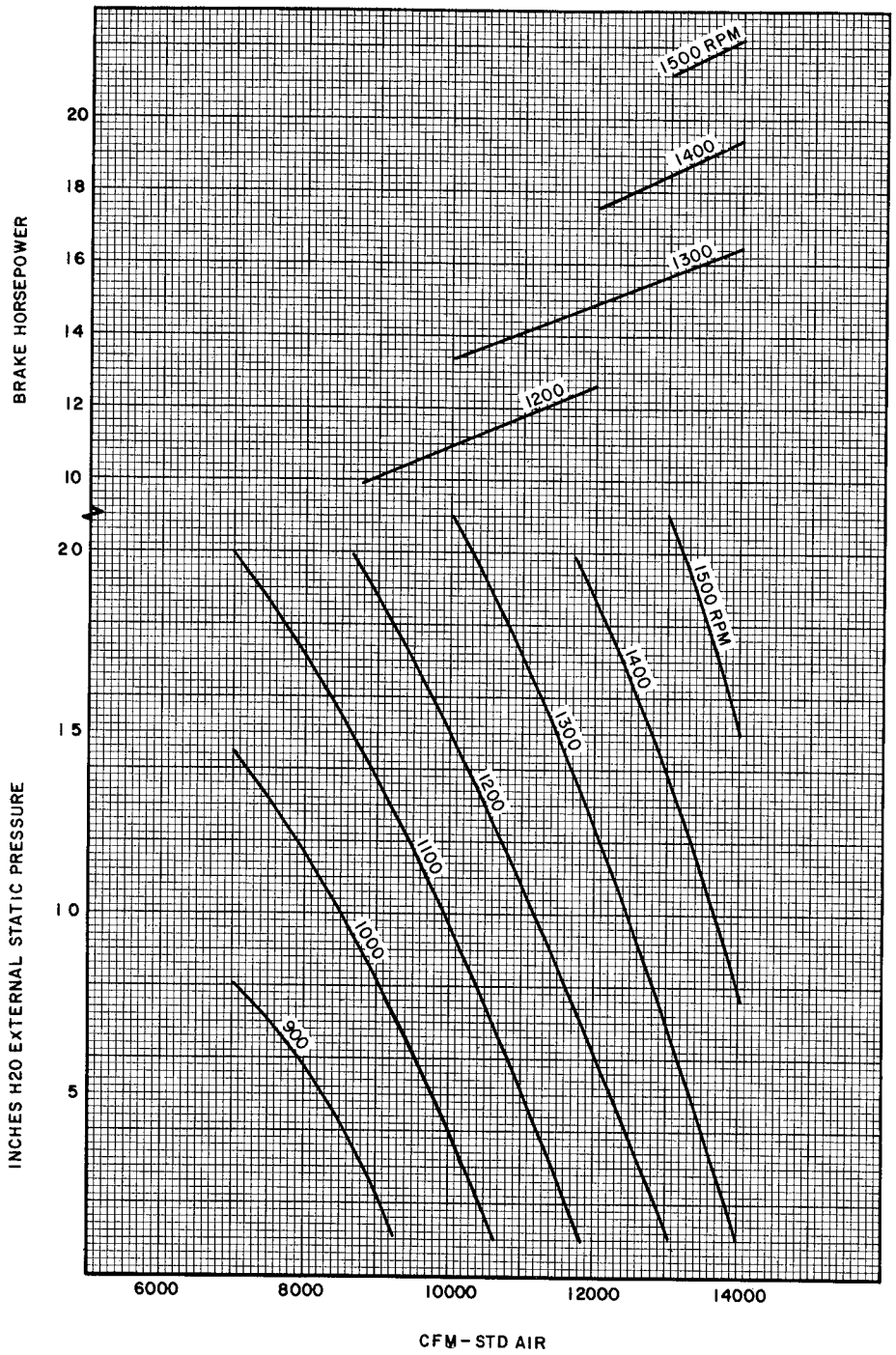


Fig. 34 – Fan Performance, 48MA/50ME034,040

HEATING PERFORMANCE

Table 5 — Electric Heater Performance

UNIT 50ME	HEAT TO COOL RATIO	TOTAL HEATER KW	STEPS OF HEAT PER MODULE	KW/STEP PER MODULE
016	.75:1	53	2	3 3
&	1:1	70	2	4.4
024	1.5:1	106	3	4.4
028	75:1	66	2	3.3
&	1:1	88	2	4.4
030	1.5:1	132	3	4.4
034	.75:1	79	2	3.3
&	1:1	106	2	4.4
040	1.5:1	158	3	4.4

Table 6 — Gas Heating Capacities (1000 Btuh)

UNIT 48MA	INPUT		BONNET CAPACITY		
	Total	Each Zone Module	Total	Each Zone Module	
				Stage 1	Full
016	480	60	360	22.5	45
024	480	60	360	22.5	45
028	600	60	450	22.5	45
030	600	60	450	22 5	45
034	720	60	540	22 5	45
040	720	60	540	22 5	45

NOTES:

1 Ratings are approved for altitudes to 2000 feet At altitudes over 2000 ft, ratings are 4% less for each 1000 ft above sea level.

2. At altitudes up to 2000 ft, the following formula may be used to calculate air temp rise:

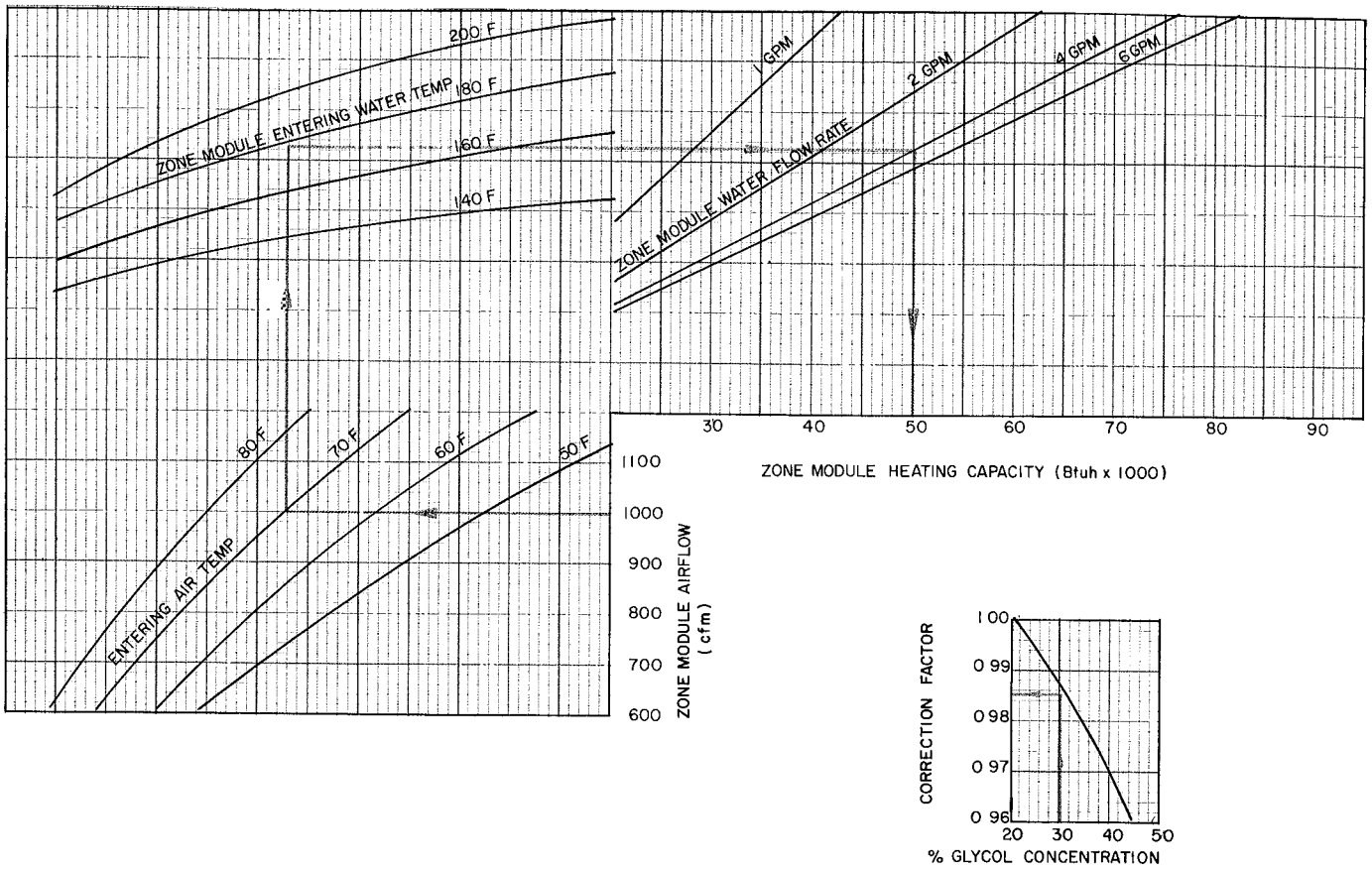
$$\Delta t = \frac{\text{bonnet capacity}}{1\ 09 \times \text{air quantity}}$$

3. At altitudes above 2000 ft, the following formula may be used:

$$\Delta t = \frac{\text{bonnet capacity}}{(24 \times \text{specific weight of air} \times 60)\ (\text{air quantity})}$$

4. Maximum allowable gas pressure is 14.0 in wg
   Minimum allowable gas pressure for full rated input is 5 0 in wg

5 Unit design is A G A certified



1 Determine zone module air quantity as described in the Selection Procedure (1000 cfm)

2 Enter curve at determined zone module air quantity Project left to intersect with entering air temperature curve (70 F)

3 From this intersection, project up to intersect with entering water temperature (180 F)

4. From this intersection, project right to intersect with Water Flow Rate (4 gpm).

5 From this intersection, project down to read Zone Module Heating Capacity (49,500 Btuh)

6 When using solution mixtures above 20% glycol concentration, reduce the capacity using the correction factor

i e If 30% glycol concentration applies to the example,

Corrected Zone Module Heating Capacity
= Zone Module Heating Capacity x Correction Factor
= 49,500 x 0 985
= 48,750 Btuh

7 See Fig 36 The Δp at 4 gpm is 8 2 psig

Fig. 35 — Hot Water/Glycol Heating Capacities (Hot Water with 20% Ethylene Glycol Solution)

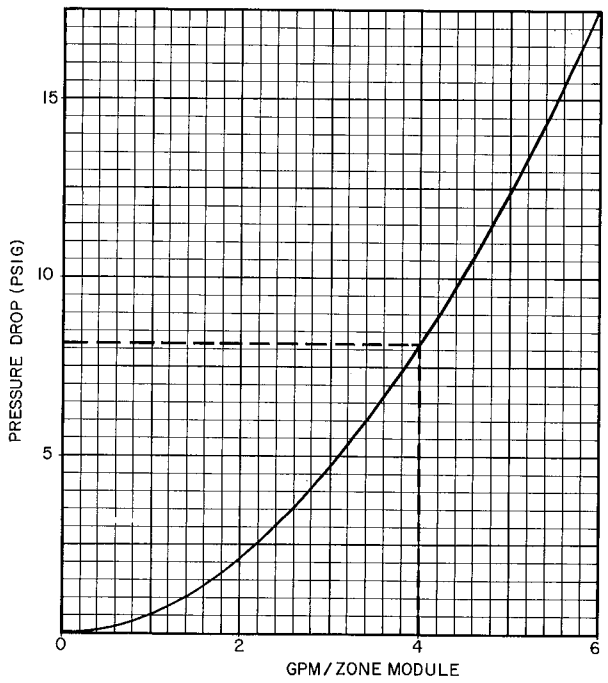


Fig. 36 — Module Pressure Drop

ELECTRICAL DATA

Table 7 — Electrical Data, 48MA

UNIT MODEL	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR NO. 1			COMPRESSOR NO. 2			OUTDOOR FAN MOTOR FLA			COMBUST FAN MOTOR	INDOOR FAN MOTOR		POWER SUPPLY	
		Min	Max	FLA	LRA	CB MTA	FLA	LRA	CB MTA	No. 1	No. 2	No. 3	FLA	Hp	FLA	Min Wire Amps	Max Fuse Amps
48MA016	200-3-60	180	229	63.6	186/266	44 5*	–	–	–	6.2	6.6	–	1.1	5 0	16 2	109 6	125
	230-3-60	207	264	57.2	168/240	40.0*	–	–	–	6.2	6.0	–	1 1	5 0	13.2	99.5	110
	460-3-60	414	528	28 6	120	40 0	–	–	–	6 2	3 0	–	1.1	5 0	6 6	49.8	60
	575-3-60	518	660	22.8	96	32 0	–	–	–	6 2	2 4	–	1.1	5.0	5 6	39.8	45
48MA024	200-3-60	180	229	44.4	170	62 0	44 4	170	62.0	6.2	6.6	–	1 1	7 5	24 0	137.5	150
	230-3-60	207	264	40.0	153	56.0	40 0	153	56 0	6.2	6.0	–	1.1	7.5	22.0	124.8	150
	460-3-60	414	528	19 9	77	27 8	19.9	77	27.8	6.2	3 0	–	1 1	7.5	11.0	62 2	70
	575-3-60	518	660	15.7	62	22.0	15.7	62	22.0	6 2	2 4	–	1.1	7.5	9.0	49 4	60
48MA028	200-3-60	180	229	63.6	266	89.0	44.4	170	62.0	6.2	6 6	–	1.1	10.0	29.0	168.1	200
	230-3-60	207	264	57.2	240	80 0	40 0	153	56 0	6 2	6.0	–	1.1	10.0	25 0	152.3	175
	460-3-60	414	528	28.6	120	40.0	19 9	77	27.8	6 2	3.0	–	1.1	10.0	12 5	76.1	90
	575-3-60	518	660	22 8	96	32.0	15.7	62	22 0	6.2	2 4	–	1.1	10 0	9.5	60 4	70
48MA030	200-3-60	180	229	63.6	266	89.0	63.6	266	89 0	6.2	6.6	–	1 1	10.0	29 0	187 3	200
	230-3-60	207	264	57 2	240	80.0	57 2	240	80 0	6 2	6.0	–	1 1	10 0	25.0	169.5	200
	460-3-60	414	528	28.6	120	41.0	28.6	120	41 0	6 2	3 0	–	1.1	10 0	12.5	84 2	100
	575-3-60	518	660	22.8	96	33 0	22.8	96	33 0	6 2	2 4	–	1 1	10.0	9 5	67.5	90
48MA034	200-3-60	180	229	63.6	266	89.0	63 6	266	89 0	6.2	6 6	6.6	1 1	15.0	45.0	210 8	225
														20.0	60 8	224.6	250
	230-3-60	207	264	57 2	240	80 0	57 2	240	80 0	6 2	6 0	6 0	1 1	15.0	38.6	188.9	200
														20.0	51 4	200 9	250
	460-3-60	414	528	28 6	120	40 0	28 6	120	40.0	6 2	3.0	3.0	1 1	15.0	19.3	94 5	100
														20 0	25.9	100 5	125
	575-3-60	518	660	22.8	96	32.0	22 8	96	32.0	6 2	2 4	2 4	1.1	15 0	15 4	75 6	90
														20.0	20 0	80 6	100
48MA040	200-3-60	180	229	80 0	332	112 0	80 0	332	112 0	6.2	6.6	6 6	1 1	15 0	45 0	247.7	300
														20 0	60 8	261.5	300
	230-3-60	207	264	77.0	300	109.0	77.0	300	109 0	6 2	6.0	6 0	1 1	15 0	38.6	233 5	300
														20 0	51.4	245.5	300
	460-3-60	414	528	38.5	150	54.0	38 5	150	54 0	6 2	3 0	3 0	1 1	15.0	19 3	116 7	150
														20 0	25 9	122.7	150
	575-3-60	518	660	31 4	120	44 0	31 4	120	44 5	6 2	2 4	2 4	1 1	15 0	15 4	95.0	125
														20 0	20 0	100 0	125

( ) Part-winding/full-winding start

FLA – Full Load Amps
LRA – Locked Rotor Amps
CB MTA – Circuit Breaker Must Trip Amps

*Unit has 2 mechanically interlocked circuit breakers. Values are for each.

NOTES:
1. Combustion air fan – 115 volts
2. Outdoor fan motor is a 200/230-1-60 motor on all units.

Table 8 — Cooling Electrical Data, 50ME

UNIT	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR NO. 1			COMPRESSOR NO. 2			OUTDOOR FAN MOTOR FLA			INDOOR FAN MOTOR FLA		POWER SUPPLY	
		Min	Max	FLA	LRA	CB MTA	FLA	LRA	CB MTA	No. 1	No. 2	No. 3	HP	FLA	Min Wire Amps	Max Fuse Amps
50ME016	200-3-60	180	229	63.6	186/266	44 5*	–	–	–	6 2	6 6	–	5 0	16 2	109 8	125
	230-3-60	207	264	57.2	168/240	40 0*	–	–	–	6.2	6 0	–	5 0	13.2	89.8	110
	460-3-60	414	528	28 6	120	40 0	–	–	–	6 2	3 0	–	5 0	6 6	49.5	60
	575-3-60	518	660	22 8	96	32 0	–	–	–	6.2	2 4	–	5 0	5.6	39.6	45
50ME024	200-3-60	180	229	44.4	170	62 0	44 4	170	62 0	6 2	6 6	–	7 5	24.0	138 0	150
	230-3-60	207	264	40 0	153	56.0	40.0	153	56 0	6 2	6 0	–	7 5	22.0	124 0	150
	460-3-60	414	528	19.9	77	27.8	19 9	77	27 8	6 2	3 0	–	7 5	11.0	61.9	70
	575-3-60	518	660	15.7	62	22.0	15 7	62	22.0	6.2	2.4	–	7 5	9 0	49 2	60
50ME028	200-3-60	180	229	63 6	266	89 0	44.4	170	62 0	6 2	6 6	–	10.0	29.0	168 9	200
	230-3-60	207	264	57.2	240	80 0	40.0	153	56.0	6 2	6.0	–	10.0	25 0	151.7	175
	460-3-60	414	528	28.6	120	40 0	19 9	77	27 8	6.2	3 0	–	10.0	12.5	75 8	90
	575-3-60	518	660	22 8	96	32 0	15 7	62	22 0	6 2	2.4	–	10.0	9.5	60 2	70
50ME030	200-3-60	180	229	63 6	266	89 0	63 6	266	89.0	6 2	6 6	–	10.0	29.0	188 0	200
	230-3-60	207	264	57 2	240	80 0	57 2	240	80 0	6 2	6.0	–	10.0	25.0	168.9	200
	460-3-60	414	528	28 6	120	41 0	28 6	120	41 0	6 2	3 0	–	10 0	12 5	84 5	100
	575-3-60	518	660	22 8	96	33 0	22 8	228	33.0	6.2	2 4	–	10 0	9 5	67.3	90
50ME034	200-3-60	180	229	63 6	266	89 0	63 6	266	89 0	6 2	6 6	6 6	15 0	45 0	210 8	225
													20 0	60.8	224 6	250
	230-3-60	207	264	57 2	240	80 0	57 2	240	80 0	6 2	6 0	6 0	15 0	38 6	188 9	200
													20 0	51 4	200 9	250
	460-3-60	414	528	28 6	120	40 0	28.6	120	40.0	6.2	3 0	3 0	15 0	19 5	94.5	100
													20.0	25.9	100.5	125
	575-3-60	518	660	22 8	96	32 0	22 8	96	32 0	6 2	2 4	2 4	15.0	15.4	75.6	90
													20 0	20.0	80 6	100
50ME040	200-3-60	180	229	80.0	332	112 0	80 0	332	112 0	6 2	6.6	6 6	15 0	45 0	247 7	300
													20 0	60.8	261.5	300
	230-3-60	207	264	77.0	300	109 0	77 0	300	109 0	6.2	6 0	6 6	15 0	38.6	233 5	300
													20.0	51.4	245.5	300
	460-3-60	414	582	38 5	150	54.0	38 5	150	54 0	6 2	3 0	3 0	15.0	19 3	116 7	150
													20 0	25 9	122 7	150
	575-3-60	518	660	31 4	120	44 0	31 4	120	44 0	6 2	2 4	2 4	15.0	15 4	95 0	125
													20 0	20 0	100 0	125

Part-winding/full-winding start

FLA — Full Load Amps
LRA — Locked Rotor Amps

*Unit has 2 mechanically interlocked circuit breakers. Values are for each.

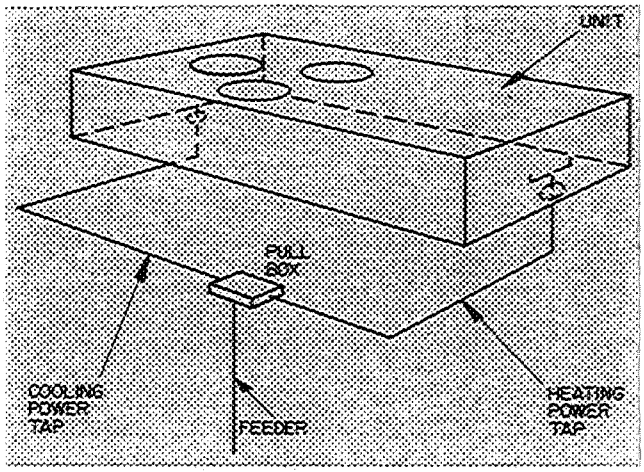
NOTE:
Outdoor air fan motor is a 200/230-1-60 motor on all units.

Table 9 – Electric Resistance Heater Data

UNIT 50ME	VOLTS (3-Ph 60-Hz)	KW	HEATING ELEMENTS PER ZONE MODULE	FULL LOAD AMPS PER HEATING ELEMENT	CB MTA EACH ZONE MODULE	MAX FUSE AMPS EACH CIRCUIT	MIN WIRE AMPS EACH CIRCUIT
016 and 024	200	53	2	16 5	52	225	215.0
	230	53		14.4	52	200	187.0
	460	53		7 2	45	100	94 0
	200	70	2	22.0	52	300	287.0
	230	70		19.2	52	250	250 0
	460	70		9 6	45	125	125 0
	200	106	3	22 0	52	200	190 4
	230	106		19.2	52	175	165.8
	460	106		9 6	45	175	165 8
	575	106		7 7	45	150	132.5
028 and 030	200	66	2	16 5	52	250	250 0
	230	66		14 4	52	225	218 0
	460	66		7 2	45	125	125 0
	200	88	2	22 0	52	350	334.0
	230	88		19.2	52	300	292 0
	460	88		9 6	45	175	167.0
	200	132	3	22 0	52	250	238 0
	230	132		19 2	52	225	207 0
	460	132		9 6	45	225	207 0
	575	132		7 7	45	175	166 0
034 and 040	200	79	2	16 5	52	300	286 4
	230	79		14 4	52	250	249 6
	460	79		7 2	45	125	124 8
	200	106	2	22 0	52	200	190 4
	230	106		19 2	52	175	165 8
	460	106		9 6	45	150	132 5
	200	158	3	22 0	52	300	285 6
	230	158		19.2	52	250	249 6
	460	158		9.6	45	250	249.6
	575	158		7 7	45	200	199.2

CB MTA – Circuit Breaker Must Trip Amps

NOTE: Terminal boards provided for heater power wire connections are suitable for use with copper or aluminum wire.



NOTES:

1. Where a single feeder is to be used, the cooling power tap may be sized according to the Cooling Minimum Wire Amps shown in the Power Wiring Data, Table 10, provided the tap is 10 ft or less in length and enclosed in a raceway
   Similarly, the heating power tap may be sized according to the Heating Minimum Wire Amps shown in the table provided the tap is 25 ft or less in length and enclosed in a raceway
2. If reheat is necessary for humidity control in all or part of the modules, use caution in sizing common feeder as heating and cooling can occur simultaneously in each reheat module
3. For 200/230 volt units, line protection is internal to the unit For 460/575 volt units, overcurrent protection must be provided in each power tap per NEC

Fig. 37 — Common Feeder Wiring

ELECTRICAL DATA (Contd)

Table 10 — Power Wiring Data

UNIT	VOLTS (Nom)	KW (Unit Total)	MINIMUM WIRE AMPS			
			Cooling	Heating Circuit		Common
				1	2	
50ME016	200	53	109 8	215.0	–	232 5
	230	53	98 9	187 0	–	202 2
	460	53	49 5	94.0	–	101 6
	200	70	109.8	287.0	–	304 5
	230	70	98.9	250.0	–	265 2
	460	70	49 5	125 0	–	132.6
	200	106	109 8	190 4	190 4	398 3
	230	106	98 9	165.8	165 8	346.8
	460	106	49 5	165 8	–	173.4
	575	106	39 6	132 5	–	138 6
50ME024	200	53	138 0	215 0	–	245 5
	230	53	124.2	187.0	–	217 7
	460	53	61.9	94.0	–	108.9
	200	70	138.0	287 0	–	312 3
	230	70	124 2	250 0	–	275 3
	460	70	61 9	125 0	–	136 0
	200	106	138 0	190.4	190 4	406.1
	230	106	124 2	165.8	165 8	353 6
	460	106	61.9	165.8	–	176 8
	575	106	49.2	132.5	–	141.8
50ME028	200	66	168 9	250.0	–	293 9
	230	66	151 7	218 0	–	260 7
	460	66	75 8	125 0	–	139 0
	200	88	168 9	334.0	–	366 2
	230	88	151 7	292 0	–	320 0
	460	88	75 8	167 0	–	181.0
	200	132	168 9	238 0	238 0	508 2
	230	132	151.7	207 0	207 0	442 0
	460	132	75 8	207 0	–	221 0
	575	132	60 2	166 0	–	183 0
50ME030	200	66	188 0	250 0	–	313 0
	230	66	168 9	218 0	–	277 9
	460	66	84 5	125.0	–	147 0
	200	88	188.0	334 0	–	366 2
	230	88	168 9	292 0	–	320 0
	460	88	84 5	167.0	–	181.0
	200	132	188 0	238 0	–	508 2
	230	132	168 9	207 0	–	444 9
	460	132	84.5	207 0	–	222 5
	575	132	67 3	166 0	–	183 0

UNIT		VOLTS (Nom)	KW (Unit Total)	MINIMUM WIRE AMPS			
				Cooling	Heating Circuit		Common
					1	2	
50ME034	15 Hp IFM	200	79	210 8	286.4	–	354.0
		230	79	188 9	249.6	–	313 7
		460	79	94.5	124.8	–	156.8
	20 Hp IFM	200	79	224.6	286 4	–	367 8
		230	79	200.9	249.6	–	325.7
		460	79	100.5	124.8	–	162.9
	15 Hp IFM	200	106	210.8	190 4	190.4	429 1
		230	106	188 9	165 8	165 8	374 8
		460	106	94 5	165 8	–	187 4
	20 Hp IFM	200	106	224 6	190 4	190.4	442 9
		230	106	200.9	165 8	165 8	385.6
		460	106	100 5	165 8	–	192 8
	15 Hp IFM	200	158	210 8	285 6	285.6	619.5
		230	158	188.9	249.6	249 6	541.2
		460	158	94.5	249 6	–	270 6
		575	158	75.6	199 2	–	216 2
	20 Hp IFM	200	158	224.6	285 6	285.6	633.3
		230	158	200 9	249 6	249 6	553 2
		460	158	100 5	249 6	–	276 6
		575	158	80 6	199 2	–	221 2
50ME040	15 Hp IFM	200	79	247 7	286 4	–	390 9
		230	79	233 5	249 6	–	358 3
		460	79	116 7	124.8	–	179.1
	20 Hp IFM	200	79	261.5	286 4	–	404 7
		230	79	245 5	249 6	–	370.3
		460	79	122 7	124 8	–	185 1
	15 Hp IFM	200	106	247 7	190 4	190.4	438 1
		230	106	233.5	165.8	165 8	399 3
		460	106	116 7	165 8	–	199.6
	20 Hp IFM	200	106	261 5	190 4	190.4	451.9
		230	106	245 5	165 8	165 8	411.3
		460	106	122 7	165 8	–	205 6
	15 Hp IFM	200	158	247 7	285 6	285 6	628.5
		230	158	233 7	249 6	249 6	566 5
		460	158	116 7	249 6	–	283 1
		575	158	95 0	199 2	–	227 8
	20 Hp IFM	200	158	261 5	285 6	285 6	642 3
		230	158	245.5	249 6	249 6	578 3
		460	158	122 7	249.6	–	289.1
		575	158	100 0	199 2	–	232 8

IFM – Indoor Air Fan Motor

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.